

SEQUENCE LISTING 13097-3

SEQUENCE LISTING



<110> Lollar, John S.

<120> Nucleic Acid and Amino Acid Sequences
encoding High-Level Expressor Factor VIII Polypeptides and
Methods of Use

<130> 007157/ 276516

<150> PCT/US02/33403

<151> 2002-10-07

<150> 60/327,388

<151> 2001-10-05

<160> 21

<170> FastSEQ for windows Version 4.0.

<210> 1

<211> 6402

<212> DNA

<213> Sus scrofa

<220>

<221> gene

<222> (1)...(6399)

<223> Factor VIII-- Full Length

<221> CDS

<222> (1)...(6399)

<400> 1

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ggc	ttt	agt	gcc	atc	agg	aga	tac	tac	ctg	ggc	gca	gtg	gaa	ctg	tcc	96
Gly	Phe	Ser	Ala	Ile	Arg	Arg	Tyr	Tyr	Leu	Gly	Ala	Val	Glu	Leu	Ser	
			20					25					30			
tgg	gac	tac	cgg	caa	agt	gaa	ctc	ctc	cgt	gag	ctg	cac	gtg	gac	acc	144
Trp	Asp	Tyr	Arg	Gln	Ser	Glu	Leu	Leu	Arg	Glu	Leu	His	Val	Asp	Thr	
		35					40					45				
aga	ttt	cct	gct	aca	gcg	cca	gga	gct	ctt	ccg	ttg	ggc	ccg	tca	gtc	192
Arg	Phe	Pro	Ala	Thr	Ala	Pro	Gly	Ala	Leu	Pro	Leu	Gly	Pro	Ser	Val	
	50					55				60						
ctg	tac	aaa	aag	act	gtg	ttc	gta	gag	ttc	acg	gat	caa	ctt	ttc	agc	240
Leu	Tyr	Lys	Lys	Thr	Val	Phe	Val	Glu	Phe	Thr	Asp	Gln	Leu	Phe	Ser	
	65				70				75						80	
gtt	gcc	agg	ccc	agg	cca	cca	tgg	atg	ggt	ctg	ctg	ggt	cct	acc	atc	288
Val	Ala	Arg	Pro	Arg	Pro	Pro	Trp	Met	Gly	Leu	Leu	Gly	Pro	Thr	Ile	
				85					90					95		
cag	gct	gag	gtt	tac	gac	acg	gtg	gtc	gtt	acc	ctg	aag	aac	atg	gct	336
Gln	Ala	Glu	Val	Tyr	Asp	Thr	Val	Val	Val	Thr	Leu	Lys	Asn	Met	Ala	
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tct cat ccc gtt agt ctt cac gct gtc ggc gtc tcc ttc tgg aaa tct	384
Ser His Pro Val Ser Leu His Ala Val Gly Val Ser Phe Trp Lys Ser	
115 120 125	
tcc gaa ggc gct gaa tat gag gat cac acc agc caa agg gag aag gaa	432
Ser Glu Gly Ala Glu Tyr Glu Asp His Thr Ser Gln Arg Glu Lys Glu	
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gac gat aaa gtc ctt ccc ggt aaa agc caa acc tac gtc tgg cag gtc	480
Asp Asp Lys Val Leu Pro Gly Lys Ser Gln Thr Tyr Val Trp Gln Val	
145 150 155 160	
ctg aaa gaa aat ggt cca aca gcc tct gac cca cca tgt ctc acc tac	528
Leu Lys Glu Asn Gly Pro Thr Ala Ser Asp Pro Pro Cys Leu Thr Tyr	
165 170 175	
tca tac ctg tct cac gtg gac ctg gtg aaa gac ctg aat tcg ggc ctc	576
Ser Tyr Leu Ser His Val Asp Leu Val Lys Asp Leu Asn Ser Gly Leu	
180 185 190	
att gga gcc ctg ctg gtt tgt aga gaa ggg agt ctg acc aga gaa agg	624
Ile Gly Ala Leu Leu Val Cys Arg Glu Gly Ser Leu Thr Arg Glu Arg	
195 200 205	
acc cag aac ctg cac gaa ttt gta cta ctt ttt gct gtc ttt gat gaa	672
Thr Gln Asn Leu His Glu Phe Val Leu Leu Phe Ala Val Phe Asp Glu	
210 215 220	
ggg aaa agt tgg cac tca gca aga aat gac tcc tgg aca cgg gcc atg	720
Gly Lys Ser Trp His Ser Ala Arg Asn Asp Ser Trp Thr Arg Ala Met	
225 230 235 240	
gat ccc gca cct gcc agg gcc cag cct gca atg cac aca gtc aat ggc	768
Asp Pro Ala Pro Ala Arg Ala Gln Pro Ala Met His Thr Val Asn Gly	
245 250 255	
tat gtc aac agg tct ctg cca ggt ctg atc gga tgt cat aag aaa tca	816
Tyr Val Asn Arg Ser Leu Pro Gly Leu Ile Gly Cys His Lys Lys Ser	
260 265 270	
gtc tac tgg cac gtg att gga atg ggc acc agc ccg gaa gtg cac tcc	864
Val Tyr Trp His Val Ile Gly Met Gly Thr Ser Pro Glu Val His Ser	
275 280 285	
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Ile Phe Leu Glu Gly His Thr Phe Leu Val Arg His His Arg Gln Ala	
290 295 300	
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Ser Leu Glu Ile Ser Pro Leu Thr Phe Leu Thr Ala Gln Thr Phe Leu	
305 310 315 320	
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Met Asp Leu Gly Gln Phe Leu Leu Phe Cys His Ile Ser Ser His His	
325 330 335	
cat ggt ggc atg gag gct cac gtc aga gta gaa agc tgc gcc gag gag	1056
His Gly Gly Met Glu Ala His Val Arg Val Glu Ser Cys Ala Glu Glu	
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ccc cag ctg cgg agg aaa gct gat gaa gag gaa gat tat gat gac aat	1104
Pro Gln Leu Arg Arg Lys Ala Asp Glu Glu Glu Asp Tyr Asp Asp Asn	
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Ser	Pro	Phe	Ile	Gln	Ile	Arg	Ser	Val	Ala	Lys	Lys	His	Pro	Lys	Thr	
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tgg	gtg	cac	tac	atc	tct	gca	gag	gag	gag	gac	tgg	gac	tac	gcc	ccc	1248
Trp	Val	His	Tyr	Ile	Ser	Ala	Glu	Glu	Glu	Asp	Trp	Asp	Tyr	Ala	Pro	
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gcg	gtc	ccc	agc	ccc	agt	gac	aga	agt	tat	aaa	agt	ctc	tac	ttg	aac	1296
Ala	Val	Pro	Ser	Pro	Ser	Asp	Arg	Ser	Tyr	Lys	Ser	Leu	Tyr	Leu	Asn	
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agt	ggt	cct	cag	cga	att	ggt	agg	aaa	tac	aaa	aaa	gct	cga	ttc	gtc	1344
Ser	Gly	Pro	Gln	Arg	Ile	Gly	Arg	Lys	Tyr	Lys	Lys	Ala	Arg	Phe	Val	
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Ala	Tyr	Thr	Asp	Val	Thr	Phe	Lys	Thr	Arg	Lys	Ala	Ile	Pro	Tyr	Glu	
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Ser	Gly	Ile	Leu	Gly	Pro	Leu	Leu	Tyr	Gly	Glu	Val	Gly	Asp	Thr	Leu	
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Leu	Ile	Ile	Phe	Lys	Asn	Lys	Ala	Ser	Arg	Pro	Tyr	Asn	Ile	Tyr	Pro	
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His	Gly	Ile	Thr	Asp	Val	Ser	Ala	Leu	His	Pro	Gly	Arg	Leu	Leu	Lys	
			500					505					510			
ggt	tgg	aaa	cat	ttg	aaa	gac	atg	cca	att	ctg	cca	gga	gag	act	ttc	1584
Gly	Trp	Lys	His	Leu	Lys	Asp	Met	Pro	Ile	Leu	Pro	Gly	Glu	Thr	Phe	
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Lys	Tyr	Lys	Trp	Thr	Val	Thr	Val	Glu	Asp	Gly	Pro	Thr	Lys	Ser	Asp	
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Pro	Arg	Cys	Leu	Thr	Arg	Tyr	Tyr	Ser	Ser	Ser	Ile	Asn	Leu	Glu	Lys	
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gat	ctg	gct	tcg	gga	ctc	att	ggc	cct	ctc	ctc	atc	tgc	tac	aaa	gaa	1728
Asp	Leu	Ala	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile	Cys	Tyr	Lys	Glu	
				565					570					575		
tct	gta	gac	caa	aga	gga	aac	cag	atg	atg	tca	gac	aag	aga	aac	gtc	1776
Ser	Val	Asp	Gln	Arg	Gly	Asn	Gln	Met	Met	Ser	Asp	Lys	Arg	Asn	Val	
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atc	ctg	ttt	tct	gta	ttc	gat	gag	aat	caa	agc	tgg	tac	ctc	gca	gag	1824
Ile	Leu	Phe	Ser	Val	Phe	Asp	Glu	Asn	Gln	Ser	Trp	Tyr	Leu	Ala	Glu	
		595					600					605				
aat	att	cag	cgc	ttc	ctc	ccc	aat	ccg	gat	gga	tta	cag	ccc	cag	gat	1872
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tac att cta agt gtt gga gca cag acg gac ttc ctc tcc gtc ttc ttc Tyr Ile Leu Ser Val Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe 660 665 670			2016
tct ggc tac acc ttc aaa cac aaa atg gtc tat gaa gac aca ctc acc Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr 675 680 685			2064
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ggt ctc tgg gtc cta ggg tgc cac aac tca gac ttg cgg aac aga ggg Gly Leu Trp Val Leu Gly Cys His Asn Ser Asp Leu Arg Asn Arg Gly 705 710 715 720			2160
atg aca gcc tta ctg aag gtg tat agt tgt gac agg gac att ggt gat Met Thr Ala Leu Leu Lys Val Tyr Ser Cys Asp Arg Asp Ile Gly Asp 725 730 735			2208
tat tat gac aac act tat gaa gat att cca ggc ttc ttg ctg agt gga Tyr Tyr Asp Asn Thr Tyr Glu Asp Ile Pro Gly Phe Leu Leu Ser Gly 740 745 750			2256
aag aat gtc att gaa ccc aga agc ttt gcc cag aat tca aga ccc cct Lys Asn Val Ile Glu Pro Arg Ser Phe Ala Gln Asn Ser Arg Pro Pro 755 760 765			2304
agt gcg agc caa aag caa ttc caa acc atc aca agt cca gaa gat gac Ser Ala Ser Gln Lys Gln Phe Gln Thr Ile Thr Ser Pro Glu Asp Asp 770 775 780			2352
gtg gag ctt gac ccg cag tct gga gag aga acc caa gca ctg gaa gaa Val Glu Leu Asp Pro Gln Ser Gly Glu Arg Thr Gln Ala Leu Glu Glu 785 790 795 800			2400
cta agt gtc ccc tct ggt gat ggg tcg atg ctc ttg gga cag aat cct Leu Ser Val Pro Ser Gly Asp Gly Ser Met Leu Leu Gly Gln Asn Pro 805 810 815			2448
gct cca cat ggc tca tcc tca tct gat ctt caa gaa gcc agg aat gag Ala Pro His Gly Ser Ser Ser Ser Asp Leu Gln Glu Ala Arg Asn Glu 820 825 830			2496
gct gat gat tat tta cct gga gca aga gaa aga ggc acg gcc cca tcc Ala Asp Asp Tyr Leu Pro Gly Ala Arg Glu Arg Gly Thr Ala Pro Ser 835 840 845			2544
gca gcg gca cgt ctc aga cca gag ctg cat cac agt gcc gaa aga gta Ala Ala Arg Leu Arg Pro Glu Leu His His Ser Ala Glu Arg Val 850 855 860			2592
ctt act cct gag cca gag aaa gag ttg aag aaa ctt gat tca aaa atg			2640

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865 870 875 880	
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Ser Ser Ser Ser Asp 885 Leu Leu Lys Thr Ser 890 Pro Thr Ile Pro Ser 895 Asp	
acg ttg tca gcg gag act gaa agg aca cat tcc tta ggc ccc cca cac	2736
Thr Leu Ser Ala 900 Glu Thr Glu Arg Thr His Ser Leu Gly Pro 910 Pro His	
ccg cag gtt aat ttc agg agt caa tta ggt gcc att gta ctt ggc aaa	2784
Pro Gln Val Asn Phe Arg Ser Gln Leu Gly Ala Ile Val Leu Gly Lys	
915 920 925	
aat tca tct cac ttt att ggg gct ggt gtc cct ttg ggc tcg act gag	2832
Asn Ser 930 Ser His Phe Ile Gly 935 Ala Gly Val Pro 940 Leu Gly Ser Thr Glu	
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Glu Asp His Glu Ser Ser 950 Leu Gly Glu Asn Val Ser Pro Val Glu Ser 960	
945 950 955 960	
gac ggg ata ttt gaa aag gaa aga gct cat gga cct gct tca ctg acc	2928
Asp Gly Ile Phe Glu 965 Lys Glu Arg Ala His 970 Gly Pro Ala Ser Leu Thr 975	
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Lys Asp Asp Val 980 Leu Phe Lys Val Asn 985 Ile Ser Leu Val Lys 990 Thr Asn	
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aat act aca gct tcg gga tta aat cat gtg tca aat tgg ata aaa ggg	3120
Asn Thr Thr Ala Ser Gly 1030 Leu Asn His Val Ser 1035 Asn Trp Ile Lys Gly 1040	
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Pro Leu Gly Lys Asn 1045 Pro Leu Ser Ser Glu Arg Gly Pro Ser Pro Glu 1055	
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Leu Leu Thr Ser 1060 Ser Gly Ser Gly Lys Ser Val Lys Gly Gln Ser Ser 1070	
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Gly Gln Gly Arg Ile Arg Val Ala Val Glu Glu Glu Glu Leu Ser Lys	
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Gly Lys Glu Met Met Leu Pro Asn Ser Glu Leu Thr Phe Leu Thr Asn	
1090 1095 1100	
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1105 1110 1115 1120	

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gcg gtt ccc cgc cgc gtt aag cag agc ttg aaa cag atc aga ctc ccg Ala Val Pro Arg Arg Val Lys Gln Ser Leu Lys Gln Ile Arg Leu Pro 1220 1225 1230	3696
cta gaa gaa ata aag cct gaa agg ggg gtg gtt ctg aat gcc acc tca Leu Glu Glu Ile Lys Pro Glu Arg Gly Val Val Leu Asn Ala Thr Ser 1235 1240 1245	3744
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ggc aaa gct gag ttt ctt cct aaa gtt cga gtt cat cgg gaa gac ctg Gly Lys Ala Glu Phe Leu Pro Lys Val Arg Val His Arg Glu Asp Leu 1315 1320 1325	3984
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cag gag atc ttc ctg cag aaa aca cgg gga cct gtt aac ctg aac aaa Gln Glu Ile Phe Leu Gln Lys Thr Arg Gly Pro Val Asn Leu Asn Lys 1345 1350 1355 1360	4080
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agg acg aaa gac atc atc agt tta ccc ctg gac cgt cac gaa agc aat Arg Thr Lys Asp Ile Ile Ser Leu Pro Leu Asp Arg His Glu Ser Asn 1395 1400 1405	4224
cat tca ata gca gca aaa aat gaa gga caa gcc gag acc caa aga gaa His Ser Ile Ala Ala Lys Asn Glu Gly Gln Ala Glu Thr Gln Arg Glu 1410 1415 1420	4272
gcc gcc tgg acg aag cag gga ggg cct gga agg ctg tgc gct cca aag Ala Ala Trp Thr Lys Gln Gly Gly Pro Gly Arg Leu Cys Ala Pro Lys 1425 1430 1435 1440	4320
cct ccg gtc ctg cga cgg cat cag agg gac ata agc ctt cct act ttt Pro Pro Val Leu Arg Arg His Gln Arg Asp Ile Ser Leu Pro Thr Phe 1445 1450 1455	4368
cag ccg gag gaa gac aaa atg gac tat gat gat atc ttc tca act gaa Gln Pro Glu Glu Asp Lys Met Asp Tyr Asp Asp Ile Phe Ser Thr Glu 1460 1465 1470	4416
acg aag gga gaa gat ttt gac att tac ggt gag gat gaa aat cag gac Thr Lys Gly Glu Asp Phe Asp Ile Tyr Gly Glu Asp Glu Asn Gln Asp 1475 1480 1485	4464
cct cgc agc ttt cag aag aga acc cga cac tat ttc att gct gcg gtg Pro Arg Ser Phe Gln Lys Arg Thr Arg His Tyr Phe Ile Ala Ala Val 1490 1495 1500	4512
gag cag ctc tgg gat tac ggg atg agc gaa tcc ccc cgg gcg cta aga Glu Gln Leu Trp Asp Tyr Gly Met Ser Glu Ser Pro Arg Ala Leu Arg 1505 1510 1515 1520	4560
aac agg gct cag aac gga gag gtg cct cgg ttc aag aag gtg gtc ttc Asn Arg Ala Gln Asn Gly Glu Val Pro Arg Phe Lys Lys Val Val Phe 1525 1530 1535	4608
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ctc aac aaa cac ttg ggg ctc ttg gga ccc tac atc aga gcg gaa gtt Leu Asn Lys His Leu Gly Leu Leu Gly Pro Tyr Ile Arg Ala Glu Val 1555 1560 1565	4704
gaa gac aac atc atg gta act ttc aaa aac cag gcg tct cgt ccc tat Glu Asp Asn Ile Met Val Thr Phe Lys Asn Gln Ala Ser Arg Pro Tyr 1570 1575 1580	4752
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gca gaa cct cga cac aac ttc gtc cag cca aat gaa acc aga act tac Ala Glu Pro Arg His Asn Phe Val Gln Pro Asn Glu Thr Arg Thr Tyr 1605 1610 1615	4848
ttt tgg aaa gtg cag cat cac atg gca ccc aca gaa gac gag ttt gac Phe Trp Lys Val Gln His His Met Ala Pro Thr Glu Asp Glu Phe Asp 1615 1620 1625	4896

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cac tca ggc ttg atc ggc ccc ctt ctg atc tgc cgc gcc aac acc ctg His Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Arg Ala Asn Thr Leu 1650 1655 1660			4992
aac gct gct cac ggt aga caa gtg acc gtg caa gaa ttt gct ctg ttt Asn Ala Ala His Gly Arg Gln Val Thr Val Gln Glu Phe Ala Leu Phe 1665 1670 1675 1680			5040
ttc act att ttt gat gag aca aag agc tgg tac ttc act gaa aat gtg Phe Thr Ile Phe Asp Glu Thr Lys Ser Trp Tyr Phe Thr Glu Asn Val 1685 1690 1695			5088
gaa agg aac tgc cgg gcc ccc tgc cac ctg cag atg gag gac ccc act Glu Arg Asn Cys Arg Ala Pro Cys His Leu Gln Met Glu Asp Pro Thr 1700 1705 1710			5136
ctg aaa gaa aac tat cgc ttc cat gca atc aat ggc tat gtg atg gat Leu Lys Glu Asn Tyr Arg Phe His Ala Ile Asn Gly Tyr Val Met Asp 1715 1720 1725			5184
aca ctc cct ggc tta gta atg gct cag aat caa agg atc cga tgg tat Thr Leu Pro Gly Leu Val Met Ala Gln Asn Gln Arg Ile Arg Trp Tyr 1730 1735 1740			5232
ctg ctc agc atg ggc agc aat gaa aat atc cat tcg att cat ttt agc Leu Leu Ser Met Gly Ser Asn Glu Asn Ile His Ser Ile His Phe Ser 1745 1750 1755 1760			5280
gga cac gtg ttc agt gta cgg aaa aag gag gag tat aaa atg gcc gtg Gly His Val Phe Ser Val Arg Lys Lys Glu Glu Tyr Lys Met Ala Val 1765 1770 1775			5328
tac aat ctc tat ccg ggt gtc ttt gag aca gtg gaa atg cta ccg tcc Tyr Asn Leu Tyr Pro Gly Val Phe Glu Thr Val Glu Met Leu Pro Ser 1780 1785 1790			5376
aaa gtt gga att tgg cga ata gaa tgc ctg att ggc gag cac ctg caa Lys Val Gly Ile Trp Arg Ile Glu Cys Leu Ile Gly Glu His Leu Gln 1795 1800 1805			5424
gct ggg atg agc acg act ttc ctg gtg tac agc aag gag tgt cag gct Ala Gly Met Ser Thr Thr Phe Leu Val Tyr Ser Lys Glu Cys Gln Ala 1810 1815 1820			5472
cca ctg gga atg gct tct gga cgc att aga gat ttt cag atc aca gct Pro Leu Gly Met Ala Ser Gly Arg Ile Arg Asp Phe Gln Ile Thr Ala 1825 1830 1835 1840			5520
tca gga cag tat gga cag tgg gcc cca aag ctg gcc aga ctt cat tat Ser Gly Gln Tyr Gly Gln Trp Ala Pro Lys Leu Ala Arg Leu His Tyr 1845 1850 1855			5568
tcc gga tca atc aat gcc tgg agc acc aag gat ccc cac tcc tgg atc Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys Asp Pro His Ser Trp Ile 1860 1865 1870			5616
aag gtg gat ctg ttg gca cca atg atc att cac ggc atc atg acc cag			5664

SEQUENCE LISTING 13097-3

Lys Val	Asp	Leu	Leu	Ala	Pro	Met	Ile	Ile	His	Gly	Ile	Met	Thr	Gln		
	1875					1880					1885					
ggt gcc cgt cag aag ttt tcc agc ctc tac atc tcc cag ttt atc atc																5712
Gly Ala Arg Gln Lys Phe Ser Ser Leu Tyr Ile Ser Gln Phe Ile Ile	1890					1895				1900						
atg tac agt ctt gac ggg agg aac tgg cag agt tac cga ggg aat tcc																5760
Met Tyr Ser Leu Asp Gly Arg Asn Trp Gln Ser Tyr Arg Gly Asn Ser	1905			1910					1915					1920		
acg ggc acc tta atg gtc ttc ttt ggc aat gtg gac gca tct ggg att																5808
Thr Gly Thr Leu Met Val Phe Phe Gly Asn Val Asp Ala Ser Gly Ile			1925					1930						1935		
aaa cac aat att ttt aac cct ccg att gtg gct cgg tac atc cgt ttg																5856
Lys His Asn Ile Phe Asn Pro Pro Ile Val Ala Arg Tyr Ile Arg Leu			1940					1945						1950		
cac cca aca cat tac agc atc cgc agc act ctt cgc atg gag ttg atg																5904
His Pro Thr His Tyr Ser Ile Arg Ser Thr Leu Arg Met Glu Leu Met			1955				1960					1965				
ggc tgt gat tta aac agt tgc agc atg ccc ctg gga atg cag aat aaa																5952
Gly Cys Asp Leu Asn Ser Cys Ser Met Pro Leu Gly Met Gln Asn Lys	1970					1975					1980					
gcg ata tca gac tca cag atc acg gcc tcc tcc cac cta agc aat ata																6000
Ala Ile Ser Asp Ser Gln Ile Thr Ala Ser Ser His Leu Ser Asn Ile	1985				1990					1995						2000
ttt gcc acc tgg tct cct tca caa gcc cga ctt cac ctc cag ggg cgg																6048
Phe Ala Thr Trp Ser Pro Ser Gln Ala Arg Leu His Leu Gln Gly Arg				2005				2010						2015		
acg aat gcc tgg cga ccc cgg gtg agc agc gca gag gag tgg ctg cag																6096
Thr Asn Ala Trp Arg Pro Arg Val Ser Ser Ala Glu Glu Trp Leu Gln			2020					2025						2030		
gtg gac ctg cag aag acg gtg aag gtc aca ggc atc acc acc cag ggc																6144
Val Asp Leu Gln Lys Thr Val Lys Val Thr Gly Ile Thr Thr Gln Gly			2035				2040						2045			
gtg aag tcc ctg ctc agc agc atg tat gtg aag gag ttc ctc gtg tcc																6192
Val Lys Ser Leu Leu Ser Ser Met Tyr Val Lys Glu Phe Leu Val Ser			2050				2055					2060				
agt agt cag gac ggc cgc cgc tgg acc ctg ttt ctt cag gac ggc cac																6240
Ser Ser Gln Asp Gly Arg Arg Trp Thr Leu Phe Leu Gln Asp Gly His	2065				2070										2080	
acg aag gtt ttt cag ggc aat cag gac tcc tcc acc ccc gtg gtg aac																6288
Thr Lys Val Phe Gln Gly Asn Gln Asp Ser Ser Thr Pro Val Val Asn				2085					2090						2095	
gct ctg gac ccc ccg ctg ttc acg cgc tac ctg agg atc cac ccc acg																6336
Ala Leu Asp Pro Pro Leu Phe Thr Arg Tyr Leu Arg Ile His Pro Thr			2100					2105					2110			
agc tgg gcg cag cac atc gcc ctg agg ctc gag gtt cta gga tgt gag																6384
Ser Trp Ala Gln His Ile Ala Leu Arg Leu Glu Val Leu Gly Cys Glu			2115				2120						2125			

SEQUENCE LISTING 13097-3

6402

gca cag gat ctc tac tga
Ala Gln Asp Leu Tyr
2130

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<211> 2133
<212> PRT
<213> Sus scrofa

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Met Gln Leu Glu Leu Ser Thr Cys Val Phe Leu Cys Leu Leu Pro Leu
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Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
20 25 30
Trp Asp Tyr Arg Gln Ser Glu Leu Arg Glu Leu His Val Asp Thr
35 40 45
Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
50 55 60
Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser
65 70 75 80
Val Ala Arg Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile
85 90 95
Gln Ala Glu Val Tyr Asp Thr Val Val Thr Leu Lys Asn Met Ala
100 105 110
Ser His Pro Val Ser Leu His Ala Val Gly Val Ser Phe Trp Lys Ser
115 120 125
Ser Glu Gly Ala Glu Tyr Glu Asp His Thr Ser Gln Arg Glu Lys Glu
130 135 140
Asp Asp Lys Val Leu Pro Gly Lys Ser Gln Thr Tyr Val Trp Gln Val
145 150 155 160
Leu Lys Glu Asn Gly Pro Thr Ala Ser Asp Pro Pro Cys Leu Thr Tyr
165 170 175
Ser Tyr Leu Ser His Val Asp Leu Val Lys Asp Leu Asn Ser Gly Leu
180 185 190
Ile Gly Ala Leu Leu Val Cys Arg Glu Gly Ser Leu Thr Arg Glu Arg
195 200 205
Thr Gln Asn Leu His Glu Phe Val Leu Leu Phe Ala Val Phe Asp Glu
210 215 220
Gly Lys Ser Trp His Ser Ala Arg Asn Asp Ser Trp Thr Arg Ala Met
225 230 235 240
Asp Pro Ala Pro Ala Arg Ala Gln Pro Ala Met His Thr Val Asn Gly
245 250 255
Tyr Val Asn Arg Ser Leu Pro Gly Leu Ile Gly Cys His Lys Lys Ser
260 265 270
Val Tyr Trp His Val Ile Gly Met Gly Thr Ser Pro Glu Val His Ser
275 280 285
Ile Phe Leu Glu Gly His Thr Phe Leu Val Arg His His Arg Gln Ala
290 295 300
Ser Leu Glu Ile Ser Pro Leu Thr Phe Leu Thr Ala Gln Thr Phe Leu
305 310 315 320
Met Asp Leu Gly Gln Phe Leu Leu Phe Cys His Ile Ser Ser His His
325 330 335
His Gly Gly Met Glu Ala His Val Arg Val Glu Ser Cys Ala Glu Glu
340 345 350
Pro Gln Leu Arg Arg Lys Ala Asp Glu Glu Glu Asp Tyr Asp Asp Asn
355 360 365
Leu Tyr Asp Ser Asp Met Asp Val Val Arg Leu Asp Gly Asp Asp Val
370 375 380
Ser Pro Phe Ile Gln Ile Arg Ser Val Ala Lys Lys His Pro Lys Thr
385 390 395 400
Trp Val His Tyr Ile Ser Ala Glu Glu Glu Asp Trp Asp Tyr Ala Pro
405 410 415

SEQUENCE LISTING 13097-3

Ala Val Pro Ser Pro Ser Asp Arg Ser Tyr Lys Ser Leu Tyr Leu Asn
420 425 430
Ser Gly Pro Gln Arg Ile Gly Arg Lys Tyr Lys Lys Ala Arg Phe Val
435 440 445
Ala Tyr Thr Asp Val Thr Phe Lys Thr Arg Lys Ala Ile Pro Tyr Glu
450 455 460
Ser Gly Ile Leu Gly Pro Leu Leu Tyr Gly Glu Val Gly Asp Thr Leu
465 470 475 480
Leu Ile Ile Phe Lys Asn Lys Ala Ser Arg Pro Tyr Asn Ile Tyr Pro
485 490 495
His Gly Ile Thr Asp Val Ser Ala Leu His Pro Gly Arg Leu Lys
500 505 510
Gly Trp Lys His Leu Lys Asp Met Pro Ile Leu Pro Gly Glu Thr Phe
515 520 525
Lys Tyr Lys Trp Thr Val Thr Val Glu Asp Gly Pro Thr Lys Ser Asp
530 535 540
Pro Arg Cys Leu Thr Arg Tyr Tyr Ser Ser Ile Asn Leu Glu Lys
545 550 555 560
Asp Leu Ala Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Tyr Lys Glu
565 570 575
Ser Val Asp Gln Arg Gly Asn Gln Met Met Ser Asp Lys Arg Asn Val
580 585 590
Ile Leu Phe Ser Val Phe Asp Glu Asn Gln Ser Trp Tyr Leu Ala Glu
595 600 605
Asn Ile Gln Arg Phe Leu Pro Asn Pro Asp Gly Leu Gln Pro Gln Asp
610 615 620
Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val
625 630 635 640
Phe Asp Ser Leu Gln Leu Ser Val Cys Leu His Glu Val Ala Tyr Trp
645 650 655
Tyr Ile Leu Ser Val Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe
660 665 670
Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr
675 680 685
Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro
690 695 700
Gly Leu Trp Val Leu Gly Cys His Asn Ser Asp Leu Arg Asn Arg Gly
705 710 715 720
Met Thr Ala Leu Leu Lys Val Tyr Ser Cys Asp Arg Asp Ile Gly Asp
725 730 735
Tyr Tyr Asp Asn Thr Tyr Glu Asp Ile Pro Gly Phe Leu Leu Ser Gly
740 745 750
Lys Asn Val Ile Glu Pro Arg Ser Phe Ala Gln Asn Ser Arg Pro Pro
755 760 765
Ser Ala Ser Gln Lys Gln Phe Gln Thr Ile Thr Ser Pro Glu Asp Asp
770 775 780
Val Glu Leu Asp Pro Gln Ser Gly Glu Arg Thr Gln Ala Leu Glu Glu
785 790 795 800
Leu Ser Val Pro Ser Gly Asp Gly Ser Met Leu Leu Gly Gln Asn Pro
805 810 815
Ala Pro His Gly Ser Ser Ser Ser Asp Leu Gln Glu Ala Arg Asn Glu
820 825 830
Ala Asp Asp Tyr Leu Pro Gly Ala Arg Glu Arg Gly Thr Ala Pro Ser
835 840 845
Ala Ala Ala Arg Leu Arg Pro Glu Leu His His Ser Ala Glu Arg Val
850 855 860
Leu Thr Pro Glu Pro Glu Lys Glu Leu Lys Lys Leu Asp Ser Lys Met
865 870 875 880
Ser Ser Ser Ser Asp Leu Leu Lys Thr Ser Pro Thr Ile Pro Ser Asp
885 890 895
Thr Leu Ser Ala Glu Thr Glu Arg Thr His Ser Leu Gly Pro Pro His
900 905 910
Pro Gln Val Asn Phe Arg Ser Gln Leu Gly Ala Ile Val Leu Gly Lys

SEQUENCE LISTING 13097-3

915 920 925
 Asn Ser Ser His Phe Ile Gly Ala Gly Val Pro Leu Gly Ser Thr Glu
 930 935 940
 Glu Asp His Glu Ser Ser Leu Gly Glu Asn Val Ser Pro Val Glu Ser
 945 950 955 960
 Asp Gly Ile Phe Glu Lys Glu Arg Ala His Gly Pro Ala Ser Leu Thr
 965 970 975
 Lys Asp Asp Val Leu Phe Lys Val Asn Ile Ser Leu Val Lys Thr Asn
 980 985 990
 Lys Ala Arg Val Tyr Leu Lys Thr Asn Arg Lys Ile His Ile Asp Asp
 995 1000 1005
 Ala Ala Leu Leu Thr Glu Asn Arg Ala Ser Ala Thr Phe Met Asp Lys
 1010 1015 1020
 Asn Thr Thr Ala Ser Gly Leu Asn His Val Ser Asn Trp Ile Lys Gly
 1025 1030 1035 1040
 Pro Leu Gly Lys Asn Pro Leu Ser Ser Glu Arg Gly Pro Ser Pro Glu
 1045 1050 1055
 Leu Leu Thr Ser Ser Gly Ser Gly Lys Ser Val Lys Gly Gln Ser Ser
 1060 1065 1070
 Gly Gln Gly Arg Ile Arg Val Ala Val Glu Glu Glu Glu Leu Ser Lys
 1075 1080 1085
 Gly Lys Glu Met Met Leu Pro Asn Ser Glu Leu Thr Phe Leu Thr Asn
 1090 1095 1100
 Ser Ala Asp Val Gln Gly Asn Asp Thr His Ser Gln Gly Lys Lys Ser
 1105 1110 1115 1120
 Arg Glu Glu Met Glu Arg Arg Glu Lys Leu Val Gln Glu Lys Val Asp
 1125 1130 1135
 Leu Pro Gln Val Tyr Thr Ala Thr Gly Thr Lys Asn Phe Leu Arg Asn
 1140 1145 1150
 Ile Phe His Gln Ser Thr Glu Pro Ser Val Glu Gly Phe Asp Gly Gly
 1155 1160 1165
 Ser His Ala Pro Val Pro Gln Asp Ser Arg Ser Leu Asn Asp Ser Ala
 1170 1175 1180
 Glu Arg Ala Glu Thr His Ile Ala His Phe Ser Ala Ile Arg Glu Glu
 1185 1190 1195 1200
 Ala Pro Leu Glu Ala Pro Gly Asn Arg Thr Gly Pro Gly Pro Arg Ser
 1205 1210 1215
 Ala Val Pro Arg Arg Val Lys Gln Ser Leu Lys Gln Ile Arg Leu Pro
 1220 1225 1230
 Leu Glu Glu Ile Lys Pro Glu Arg Gly Val Val Leu Asn Ala Thr Ser
 1235 1240 1245
 Thr Arg Trp Ser Glu Ser Ser Pro Ile Leu Gln Gly Ala Lys Arg Asn
 1250 1255 1260
 Asn Leu Ser Leu Pro Phe Leu Thr Leu Glu Met Ala Gly Gly Gln Gly
 1265 1270 1275 1280
 Lys Ile Ser Ala Leu Gly Lys Ser Ala Ala Gly Pro Leu Ala Ser Gly
 1285 1290 1295
 Lys Leu Glu Lys Ala Val Leu Ser Ser Ala Gly Leu Ser Glu Ala Ser
 1300 1305 1310
 Gly Lys Ala Glu Phe Leu Pro Lys Val Arg Val His Arg Glu Asp Leu
 1315 1320 1325
 Leu Pro Gln Lys Thr Ser Asn Val Ser Cys Ala His Gly Asp Leu Gly
 1330 1335 1340
 Gln Glu Ile Phe Leu Gln Lys Thr Arg Gly Pro Val Asn Leu Asn Lys
 1345 1350 1355 1360
 Val Asn Arg Pro Gly Arg Thr Pro Ser Lys Leu Leu Gly Pro Pro Met
 1365 1370 1375
 Pro Lys Glu Trp Glu Ser Leu Glu Lys Ser Pro Lys Ser Thr Ala Leu
 1380 1385 1390
 Arg Thr Lys Asp Ile Ile Ser Leu Pro Leu Asp Arg His Glu Ser Asn
 1395 1400 1405
 His Ser Ile Ala Ala Lys Asn Glu Gly Gln Ala Glu Thr Gln Arg Glu
 1410 1415 1420

SEQUENCE LISTING 13097-3

Ala Ala Trp Thr Lys Gln Gly Gly Pro Gly Arg Leu Cys Ala Pro Lys
1425 1430 1435 1440
Pro Pro Val Leu Arg Arg His Gln Arg Asp Ile Ser Leu Pro Thr Phe
1445 1450 1455
Gln Pro Glu Glu Asp Lys Met Asp Tyr Asp Asp Ile Phe Ser Thr Glu
1460 1465 1470
Thr Lys Gly Glu Asp Phe Asp Ile Tyr Gly Glu Asp Glu Asn Gln Asp
1475 1480 1485
Pro Arg Ser Phe Gln Lys Arg Thr Arg His Tyr Phe Ile Ala Ala Val
1490 1495 1500
Glu Gln Leu Trp Asp Tyr Gly Met Ser Glu Ser Pro Arg Ala Leu Arg
1505 1510 1515 1520
Asn Arg Ala Gln Asn Gly Glu Val Pro Arg Phe Lys Lys Val Val Phe
1525 1530 1535
Arg Glu Phe Ala Asp Gly Ser Phe Thr Gln Pro Ser Tyr Arg Gly Glu
1540 1545 1550
Leu Asn Lys His Leu Gly Leu Leu Gly Pro Tyr Ile Arg Ala Glu Val
1555 1560 1565
Glu Asp Asn Ile Met Val Thr Phe Lys Asn Gln Ala Ser Arg Pro Tyr
1570 1575 1580
Ser Phe Tyr Ser Ser Leu Ile Ser Tyr Pro Asp Asp Gln Glu Gln Gly
1585 1590 1595 1600
Ala Glu Pro Arg His Asn Phe Val Gln Pro Asn Glu Thr Arg Thr Tyr
1605 1610 1615
Phe Trp Lys Val Gln His His Met Ala Pro Thr Glu Asp Glu Phe Asp
1620 1625 1630
Cys Lys Ala Trp Ala Tyr Phe Ser Asp Val Asp Leu Glu Lys Asp Val
1635 1640 1645
His Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Arg Ala Asn Thr Leu
1650 1655 1660
Asn Ala Ala His Gly Arg Gln Val Thr Val Gln Glu Phe Ala Leu Phe
1665 1670 1675 1680
Phe Thr Ile Phe Asp Glu Thr Lys Ser Trp Tyr Phe Thr Glu Asn Val
1685 1690 1695
Glu Arg Asn Cys Arg Ala Pro Cys His Leu Gln Met Glu Asp Pro Thr
1700 1705 1710
Leu Lys Glu Asn Tyr Arg Phe His Ala Ile Asn Gly Tyr Val Met Asp
1715 1720 1725
Thr Leu Pro Gly Leu Val Met Ala Gln Asn Gln Arg Ile Arg Trp Tyr
1730 1735 1740
Leu Leu Ser Met Gly Ser Asn Glu Asn Ile His Ser Ile His Phe Ser
1745 1750 1755 1760
Gly His Val Phe Ser Val Arg Lys Lys Glu Glu Tyr Lys Met Ala Val
1765 1770 1775
Tyr Asn Leu Tyr Pro Gly Val Phe Glu Thr Val Glu Met Leu Pro Ser
1780 1785 1790
Lys Val Gly Ile Trp Arg Ile Glu Cys Leu Ile Gly Glu His Leu Gln
1795 1800 1805
Ala Gly Met Ser Thr Thr Phe Leu Val Tyr Ser Lys Glu Cys Gln Ala
1810 1815 1820
Pro Leu Gly Met Ala Ser Gly Arg Ile Arg Asp Phe Gln Ile Thr Ala
1825 1830 1835 1840
Ser Gly Gln Tyr Gly Gln Trp Ala Pro Lys Leu Ala Arg Leu His Tyr
1845 1850 1855
Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys Asp Pro His Ser Trp Ile
1860 1865 1870
Lys Val Asp Leu Leu Ala Pro Met Ile Ile His Gly Ile Met Thr Gln
1875 1880 1885
Gly Ala Arg Gln Lys Phe Ser Ser Leu Tyr Ile Ser Gln Phe Ile Ile
1890 1895 1900
Met Tyr Ser Leu Asp Gly Arg Asn Trp Gln Ser Tyr Arg Gly Asn Ser
1905 1910 1915 1920
Thr Gly Thr Leu Met Val Phe Phe Gly Asn Val Asp Ala Ser Gly Ile

SEQUENCE LISTING 13097-3

1925 1930 1935
 Lys His Asn Ile Phe Asn Pro Pro Ile Val Ala Arg Tyr Ile Arg Leu
 1940 1945 1950
 His Pro Thr His Tyr Ser Ile Arg Ser Thr Leu Arg Met Glu Leu Met
 1955 1960 1965
 Gly Cys Asp Leu Asn Ser Cys Ser Met Pro Leu Gly Met Gln Asn Lys
 1970 1975 1980
 Ala Ile Ser Asp Ser Gln Ile Thr Ala Ser Ser His Leu Ser Asn Ile
 1985 1990 1995 2000
 Phe Ala Thr Trp Ser Pro Ser Gln Ala Arg Leu His Leu Gln Gly Arg
 2005 2010 2015
 Thr Asn Ala Trp Arg Pro Arg Val Ser Ser Ala Glu Glu Trp Leu Gln
 2020 2025 2030
 Val Asp Leu Gln Lys Thr Val Lys Val Thr Gly Ile Thr Thr Gln Gly
 2035 2040 2045
 Val Lys Ser Leu Leu Ser Ser Met Tyr Val Lys Glu Phe Leu Val Ser
 2050 2055 2060
 Ser Ser Gln Asp Gly Arg Arg Trp Thr Leu Phe Leu Gln Asp Gly His
 2065 2070 2075 2080
 Thr Lys Val Phe Gln Gly Asn Gln Asp Ser Ser Thr Pro Val Val Asn
 2085 2090 2095
 Ala Leu Asp Pro Pro Leu Phe Thr Arg Tyr Leu Arg Ile His Pro Thr
 2100 2105 2110
 Ser Trp Ala Gln His Ile Ala Leu Arg Leu Glu Val Leu Gly Cys Glu
 2115 2120 2125
 Ala Gln Asp Leu Tyr
 2130

<210> 3
 <211> 4404
 <212> DNA
 <213> Sus scrofa

<220>
 <221> gene
 <222> (1)...(4401)
 <223> Factor VIII-- B-domain deleted

<221> CDS
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 Met Gln Leu Glu Leu Ser Thr Cys Val Phe Leu Cys Leu Leu Pro Leu
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 ggc ttt agt gcc atc agg aga tac tac ctg ggc gca gtg gaa ctg tcc 96
 Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
 20 25 30
 tgg gac tac cgg caa agt gaa ctc ctc cgt gag ctg cac gtg gac acc 144
 Trp Asp Tyr Arg Gln Ser Glu Leu Leu Arg Glu Leu His Val Asp Thr
 35 40 45
 aga ttt cct gct aca gcg cca gga gct ctt ccg ttg ggc ccg tca gtc 192
 Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
 50 55 60
 ctg tac aaa aag act gtg ttc gta gag ttc acg gat caa ctt ttc agc 240
 Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser
 65 70 75 80

SEQUENCE LISTING 13097-3

gtt gcc agg ccc agg cca cca tgg atg ggt ctg ctg ggt cct acc atc	288
Val Ala Arg Pro Arg 85 Pro Pro Trp Met Gly 90 Leu Leu Gly Pro Thr 95 Ile	
cag gct gag gtt tac gac acg gtg gtc gtt acc ctg aag aac atg gct	336
Gln Ala Glu Val Tyr Asp Thr Val Val Val Thr Leu Lys Asn Met Ala	
100 105 110	
tct cat ccc gtt agt ctt cac gct gtc ggc gtc tcc ttc tgg aaa tct	384
Ser His Pro 115 Val Ser Leu His Ala 120 Val Gly Val Ser Phe 125 Trp Lys Ser	
tcc gaa ggc gct gaa tat gag gat cac acc agc caa agg gag aag gaa	432
Ser Glu Gly Ala Glu Tyr Glu Asp His Thr Ser Gln Arg Glu Lys Glu	
130 135 140	
gac gat aaa gtc ctt ccc ggt aaa agc caa acc tac gtc tgg cag gtc	480
Asp Asp Lys Val Leu Pro Gly Lys Ser Gln Thr Tyr Val Trp Gln Val	
145 150 155 160	
ctg aaa gaa aat ggt cca aca gcc tct gac cca cca tgt ctt acc tac	528
Leu Lys Glu Asn Gly 165 Pro Thr Ala Ser Asp Pro Pro Cys Leu Thr Tyr	
170 175	
tca tac ctg tct cac gtg gac ctg gtg aaa gac ctg aat tcg ggc ctc	576
Ser Tyr Leu Ser His Val Asp Leu Val Lys Asp Leu Asn Ser Gly Leu	
180 185 190	
att gga gcc ctg ctg gtt tgt aga gaa ggg agt ctg acc aga gaa agg	624
Ile Gly Ala 195 Leu Leu Val Cys Arg Glu Gly Ser Leu Thr 205 Arg Glu Arg	
200	
acc cag aac ctg cac gaa ttt gta cta ctt ttt gct gtc ttt gat gaa	672
Thr Gln Asn Leu His Glu Phe Val Leu Leu Phe Ala Val Phe Asp Glu	
210 215 220	
ggg aaa agt tgg cac tca gca aga aat gac tcc tgg aca cgg gcc atg	720
Gly Lys Ser Trp His Ser Ala Arg Asn Asp Ser Trp Thr Arg Ala Met	
225 230 235 240	
gat ccc gca cct gcc agg gcc cag cct gca atg cac aca gtc aat ggc	768
Asp Pro Ala Pro Ala Arg Ala Gln Pro Ala Met His Thr Val Asn Gly	
245 250 255	
tat gtc aac agg tct ctg cca ggt ctg atc gga tgt cat aag aaa tca	816
Tyr Val Asn Arg Ser Leu Pro Gly Leu Ile Gly Cys His Lys Lys Ser	
260 265 270	
gtc tac tgg cac gtg att gga atg ggc acc agc ccg gaa gtg cac tcc	864
Val Tyr Trp His Val Ile Gly Met Gly Thr Ser Pro Glu Val His Ser	
275 280 285	
att ttt ctt gaa ggc cac acg ttt ctc gtg agg cac cat cgc cag gct	912
Ile Phe 290 Leu Glu Gly His Thr 295 Phe Leu Val Arg His 300 His Arg Gln Ala	
305	
tcc ttg gag atc tcg cca cta act ttc ctc act gct cag aca ttc ctg	960
Ser Leu Glu Ile Ser Pro Leu Thr Phe Leu Thr Ala Gln Thr Phe Leu	
310 315 320	
atg gac ctt ggc cag ttc cta ctg ttt tgt cat atc tct tcc cac cac	1008
Met Asp Leu Gly Gln Phe Leu Leu Phe Cys 330 His Ile Ser Ser His His	
325 335	

SEQUENCE LISTING 13097-3

cat ggt ggc atg gag gct cac gtc aga gta gaa agc tgc gcc gag gag	1056
His Gly Gly Met Glu Ala His Val Arg Val Glu Ser Cys Ala Glu Glu	
340 345 350	
ccc cag ctg cgg agg aaa gct gat gaa gag gaa gat tat gat gac aat	1104
Pro Gln Leu Arg Arg Lys Ala Asp Glu Glu Glu Asp Tyr Asp Asp Asn	
355 360 365	
ttg tac gac tcg gac atg gac gtg gtc cgg ctc gat ggt gac gac gtg	1152
Leu Tyr Asp Ser Asp Met Asp Val Val Arg Leu Asp Gly Asp Asp Val	
370 375 380	
tct ccc ttt atc caa atc cgc tcg gtt gcc aag aag cat ccc aaa acc	1200
Ser Pro Phe Ile Gln Ile Arg Ser Val Ala Lys Lys His Pro Lys Thr	
385 390 395 400	
tgg gtg cac tac atc tct gca gag gag gag gac tgg gac tac gcc ccc	1248
Trp Val His Tyr Ile Ser Ala Glu Glu Glu Asp Trp Asp Tyr Ala Pro	
405 410 415	
gcg gtc ccc agc ccc agt gac aga agt tat aaa agt ctc tac ttg aac	1296
Ala Val Pro Ser Pro Ser Asp Arg Ser Tyr Lys Ser Leu Tyr Leu Asn	
420 425 430	
agt ggt cct cag cga att ggt agg aaa tac aaa aaa gct cga ttc gtc	1344
Ser Gly Pro Gln Arg Ile Gly Arg Lys Tyr Lys Lys Ala Arg Phe Val	
435 440 445	
gct tac acg gat gta aca ttt aag act cgt aaa gct att ccg tat gaa	1392
Ala Tyr Thr Asp Val Thr Phe Lys Thr Arg Lys Ala Ile Pro Tyr Glu	
450 455 460	
tca gga atc ctg gga cct tta ctt tat gga gaa gtt gga gac aca ctt	1440
Ser Gly Ile Leu Gly Pro Leu Leu Tyr Gly Glu Val Gly Asp Thr Leu	
465 470 475 480	
ttg att ata ttt aag aat aaa gcg agc cga cca tat aac atc tac cct	1488
Leu Ile Ile Phe Lys Asn Lys Ala Ser Arg Pro Tyr Asn Ile Tyr Pro	
485 490 495	
cat gga atc act gat gtc agc gct ttg cac cca ggg aga ctt cta aaa	1536
His Gly Ile Thr Asp Val Ser Ala Leu His Pro Gly Arg Leu Leu Lys	
500 505 510	
ggt tgg aaa cat ttg aaa gac atg cca att ctg cca gga gag act ttc	1584
Gly Trp Lys His Leu Lys Asp Met Pro Ile Leu Pro Gly Glu Thr Phe	
515 520 525	
aag tat aaa tgg aca gtg act gtg gaa gat ggg cca acc aag tcc gat	1632
Lys Tyr Lys Trp Thr Val Thr Val Glu Asp Gly Pro Thr Lys Ser Asp	
530 535 540	
cct cgg tgc ctg acc cgc tac tac tcg agc tcc att aat cta gag aaa	1680
Pro Arg Cys Leu Thr Arg Tyr Tyr Ser Ser Ile Asn Leu Glu Lys	
545 550 555 560	
gat ctg gct tcg gga ctc att ggc cct ctc ctc atc tgc tac aaa gaa	1728
Asp Leu Ala Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Tyr Lys Glu	
565 570 575	
tct gta gac caa aga gga aac cag atg atg tca gac aag aga aac gtc	1776
Ser Val Asp Gln Arg Gly Asn Gln Met Met Ser Asp Lys Arg Asn Val	

SEQUENCE LISTING 13097-3

580															585	590															
atc	ctg	ttt	tct	gta	ttc	gat	gag	aat	caa	agc	tgg	tac	ctc	gca	gag	1824															
Ile	Leu	Phe	Ser	Val	Phe	Asp	Glu	Asn	Gln	Ser	Trp	Tyr	Leu	Ala	Glu																
		595					600					605																			
aat	att	cag	cgc	ttc	ctc	ccc	aat	ccg	gat	gga	tta	cag	ccc	cag	gat	1872															
Asn	Ile	Gln	Arg	Phe	Leu	Pro	Asn	Pro	Asp	Gly	Leu	Gln	Pro	Gln	Asp																
	610					615					620																				
cca	gag	ttc	caa	gct	tct	aac	atc	atg	cac	agc	atc	aat	ggc	tat	gtt	1920															
Pro	Glu	Phe	Gln	Ala	Ser	Asn	Ile	Met	His	Ser	Ile	Asn	Gly	Tyr	Val																
625					630					635					640																
ttt	gat	agc	ttg	cag	ctg	tcg	gtt	tgt	ttg	cac	gag	gtg	gca	tac	tgg	1968															
Phe	Asp	Ser	Leu	Gln	Leu	Ser	Val	Cys	Leu	His	Glu	Val	Ala	Tyr	Trp																
				645					650					655																	
tac	att	cta	agt	gtt	gga	gca	cag	acg	gac	ttc	ctc	tcc	gtc	ttc	ttc	2016															
Tyr	Ile	Leu	Ser	Val	Gly	Ala	Gln	Thr	Asp	Phe	Leu	Ser	Val	Phe	Phe																
			660					665					670																		
tct	ggc	tac	acc	ttc	aaa	cac	aaa	atg	gtc	tat	gaa	gac	aca	ctc	acc	2064															
Ser	Gly	Tyr	Thr	Phe	Lys	His	Lys	Met	Val	Tyr	Glu	Asp	Thr	Leu	Thr																
		675					680					685																			
ctg	ttc	ccc	ttc	tca	gga	gaa	acg	gtc	ttc	atg	tca	atg	gaa	aac	cca	2112															
Leu	Phe	Pro	Phe	Ser	Gly	Glu	Thr	Val	Phe	Met	Ser	Met	Glu	Asn	Pro																
		690				695					700																				
ggt	ctc	tgg	gtc	ctt	ggg	tgc	cac	aac	tca	gac	ttg	cgg	aac	aga	ggg	2160															
Gly	Leu	Trp	Val	Leu	Gly	Cys	His	Asn	Ser	Asp	Leu	Arg	Asn	Arg	Gly																
705					710					715					720																
atg	aca	gcc	tta	ctg	aag	gtg	tat	agt	tgt	gac	agg	gac	att	ggt	gat	2208															
Met	Thr	Ala	Leu	Leu	Lys	Val	Tyr	Ser	Cys	Asp	Arg	Asp	Ile	Gly	Asp																
				725					730					735																	
tat	tat	gac	aac	act	tat	gaa	gat	att	cca	ggc	ttc	ttg	ctg	agt	gga	2256															
Tyr	Tyr	Asp	Asn	Thr	Tyr	Glu	Asp	Ile	Pro	Gly	Phe	Leu	Leu	Ser	Gly																
			740					745					750																		
aag	aat	gtc	att	gaa	cct	agg	agc	ttt	gcc	cag	aat	tca	aga	ccc	cct	2304															
Lys	Asn	Val	Ile	Glu	Pro	Arg	Ser	Phe	Ala	Gln	Asn	Ser	Arg	Pro	Pro																
		755					760					765																			
agt	gcg	agc	gct	cca	aag	cct	ccg	gtc	ctg	cga	cgg	cat	cag	agg	gac	2352															
Ser	Ala	Ser	Ala	Pro	Lys	Pro	Pro	Val	Leu	Arg	Arg	His	Gln	Arg	Asp																
						775					780																				
ata	agc	ctt	cct	act	ttt	cag	ccg	gag	gaa	gac	aaa	atg	gac	tat	gat	2400															
Ile	Ser	Leu	Pro	Thr	Phe	Gln	Pro	Glu	Glu	Asp	Lys	Met	Asp	Tyr	Asp																
785					790					795					800																
gat	atc	ttc	tca	act	gaa	acg	aag	gga	gaa	gat	ttt	gac	att	tac	ggt	2448															
Asp	Ile	Phe	Ser	Thr	Glu	Thr	Lys	Gly	Glu	Asp	Phe	Asp	Ile	Tyr	Gly																
				805					810					815																	
gag	gat	gaa	aat	cag	gac	cct	cgc	agc	ttt	cag	aag	aga	acc	cga	cac	2496															
Glu	Asp	Glu	Asn	Gln	Asp	Pro	Arg	Ser	Phe	Gln	Lys	Arg	Thr	Arg	His																
			820					825					830																		
tat	ttc	att	gct	gcg	gtg	gag	cag	ctc	tgg	gat	tac	ggg	atg	agc	gaa	2544															

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Tyr	Phe	Ile	Ala	Ala	Val	Glu	Gln	Leu	Trp	Asp	Tyr	Gly	Met	Ser	Glu		
		835					840					845					
tcc	ccc	cgg	gcg	cta	aga	aac	agg	gct	cag	aac	gga	gag	gtg	cct	cgg	2592	
Ser	Pro	Arg	Ala	Leu	Arg	Asn	Arg	Ala	Gln	Asn	Gly	Glu	Val	Pro	Arg		
	850					855					860						
ttc	aag	aag	gtg	gtc	ttc	cgg	gaa	ttt	gct	gac	ggc	tcc	ttc	acg	cag	2640	
Phe	Lys	Lys	Val	Val	Phe	Arg	Glu	Phe	Ala	Asp	Gly	Ser	Phe	Thr	Gln		
865					870					875					880		
ccg	tcg	tac	cgc	ggg	gaa	ctc	aac	aaa	cac	ttg	ggg	ctc	ttg	gga	ccc	2688	
Pro	Ser	Tyr	Arg	Gly	Glu	Leu	Asn	Lys	His	Leu	Gly	Leu	Leu	Gly	Pro		
				885					890					895			
tac	atc	aga	gcg	gaa	gtt	gaa	gac	aac	atc	atg	gta	act	ttc	aaa	aac	2736	
Tyr	Ile	Arg	Ala	Glu	Val	Glu	Asp	Asn	Ile	Met	Val	Thr	Phe	Lys	Asn		
			900					905					910				
cag	gcg	tct	cgt	ccc	tat	tcc	ttc	tac	tcg	agc	ctt	att	tct	tat	ccg	2784	
Gln	Ala	Ser	Arg	Pro	Tyr	Ser	Phe	Tyr	Ser	Ser	Leu	Ile	Ser	Tyr	Pro		
		915					920					925					
gat	gat	cag	gag	caa	ggg	gca	gaa	cct	cga	cac	aac	ttc	gtc	cag	cca	2832	
Asp	Asp	Gln	Glu	Gln	Gly	Ala	Glu	Pro	Arg	His	Asn	Phe	Val	Gln	Pro		
	930					935					940						
aat	gaa	acc	aga	act	tac	ttt	tgg	aaa	gtg	cag	cat	cac	atg	gca	ccc	2880	
Asn	Glu	Thr	Arg	Thr	Tyr	Phe	Trp	Lys	Val	Gln	His	His	Met	Ala	Pro		
945					950					955					960		
aca	gaa	gac	gag	ttt	gac	tgc	aaa	gcc	tgg	gcc	tac	ttt	tct	gat	gtt	2928	
Thr	Glu	Asp	Glu	Phe	Asp	Cys	Lys	Ala	Trp	Ala	Tyr	Phe	Ser	Asp	Val		
				965					970					975			
gac	ctg	gaa	aaa	gat	gtg	cac	tca	ggc	ttg	atc	ggc	ccc	ctt	ctg	atc	2976	
Asp	Leu	Glu	Lys	Asp	Val	His	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile		
			980					985					990				
tgc	cgc	gcc	aac	acc	ctg	aac	gct	gct	cac	ggt	aga	caa	gtg	acc	gtg	3024	
Cys	Arg	Ala	Asn	Thr	Leu	Asn	Ala	Ala	His	Gly	Arg	Gln	Val	Thr	Val		
		995					1000					1005					
caa	gaa	ttt	gct	ctg	ttt	ttc	act	att	ttt	gat	gag	aca	aag	agc	tgg	3072	
Gln	Glu	Phe	Ala	Leu	Phe	Phe	Thr	Ile	Phe	Asp	Glu	Thr	Lys	Ser	Trp		
	1010					1015					1020						
tac	ttc	act	gaa	aat	gtg	gaa	agg	aac	tgc	cgg	gcc	ccc	tgc	cat	ctg	3120	
Tyr	Phe	Thr	Glu	Asn	Val	Glu	Arg	Asn	Cys	Arg	Ala	Pro	Cys	His	Leu		
1025					1030					1035					1040		
cag	atg	gag	gac	ccc	act	ctg	aaa	gaa	aac	tat	cgc	ttc	cat	gca	atc	3168	
Gln	Met	Glu	Asp	Pro	Thr	Leu	Lys	Glu	Asn	Tyr	Arg	Phe	His	Ala	Ile		
				1045					1050					1055			
aat	ggc	tat	gtg	atg	gat	aca	ctc	cct	ggc	tta	gta	atg	gct	cag	aat	3216	
Asn	Gly	Tyr	Val	Met	Asp	Thr	Leu	Pro	Gly	Leu	Val	Met	Ala	Gln	Asn		
			1060					1065					1070				
caa	agg	atc	cga	tgg	tat	ctg	ctc	agc	atg	ggc	agc	aat	gaa	aat	atc	3264	
Gln	Arg	Ile	Arg	Trp	Tyr	Leu	Leu	Ser	Met	Gly	Ser	Asn	Glu	Asn	Ile		
		1075					1080					1085					

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cat tcg att cat ttt agc gga cac gtg ttc agt gta cgg aaa aag gag His Ser Ile His Phe Ser Gly His Val Phe Ser Val Arg Lys Lys Glu 1090 1095 1100	3312
gag tat aaa atg gcc gtg tac aat ctc tat ccg ggt gtc ttt gag aca Glu Tyr Lys Met Ala Val Tyr Asn Leu Tyr Pro Gly Val Phe Glu Thr 1105 1110 1115 1120	3360
gtg gaa atg cta ccg tcc aaa gtt gga att tgg cga ata gaa tgc ctg Val Glu Met Leu Pro Ser Lys Val Gly Ile Trp Arg Ile Glu Cys Leu 1125 1130 1135	3408
att ggc gag cac ctg caa gct ggg atg agc acg act ttc ctg gtg tac Ile Gly Glu His Leu Gln Ala Gly Met Ser Thr Thr Phe Leu Val Tyr 1140 1145 1150	3456
agc aag gag tgt cag gct cca ctg gga atg gct tct gga cgc att aga Ser Lys Glu Cys Gln Ala Pro Leu Gly Met Ala Ser Gly Arg Ile Arg 1155 1160 1165	3504
gat ttt cag atc aca gct tca gga cag tat gga cag tgg gcc cca aag Asp Phe Gln Ile Thr Ala Ser Gly Gln Tyr Gly Gln Trp Ala Pro Lys 1170 1175 1180	3552
ctg gcc aga ctt cat tat tcc gga tca atc aat gcc tgg agc acc aag Leu Ala Arg Leu His Tyr Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys 1185 1190 1195 1200	3600
gat ccc cac tcc tgg atc aag gtg gat ctg ttg gca cca atg atc att Asp Pro His Ser Trp Ile Lys Val Asp Leu Leu Ala Pro Met Ile Ile 1205 1210 1215	3648
cac ggc atc atg acc cag ggt gcc cgt cag aag ttt tcc agc ctc tac His Gly Ile Met Thr Gln Gly Ala Arg Gln Lys Phe Ser Ser Leu Tyr 1220 1225 1230	3696
atc tcc cag ttt atc atc atg tac agt ctt gac ggg agg aac tgg cag Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu Asp Gly Arg Asn Trp Gln 1235 1240 1245	3744
agt tac cga ggg aat tcc acg ggc acc tta atg gtc ttc ttt ggc aat Ser Tyr Arg Gly Asn Ser Thr Gly Thr Leu Met Val Phe Phe Gly Asn 1250 1255 1260	3792
gtg gac gca tct ggg att aaa cac aat att ttt aac cct ccg att gtg Val Asp Ala Ser Gly Ile Lys His Asn Ile Phe Asn Pro Pro Ile Val 1265 1270 1275 1280	3840
gct cgg tac atc cgt ttg cac cca aca cat tac agc atc cgc agc act Ala Arg Tyr Ile Arg Leu His Pro Thr His Tyr Ser Ile Arg Ser Thr 1285 1290 1295	3888
ctt cgc atg gag ttg atg ggc tgt gat tta aac agt tgc agc atg ccc Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser Cys Ser Met Pro 1300 1305 1310	3936
ctg gga atg cag aat aaa gcg ata tca gac tca cag atc acg gcc tcc Leu Gly Met Gln Asn Lys Ala Ile Ser Asp Ser Gln Ile Thr Ala Ser 1315 1320 1325	3984
tcc cac cta agc aat ata ttt gcc acc tgg tct cct tca caa gcc cga Ser His Leu Ser Asn Ile Phe Ala Thr Trp Ser Pro Ser Gln Ala Arg 1330 1335 1340	4032

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ctt cac ctc cag ggg cgg acg aat gcc tgg cga ccc cgg gtg agc agc	4080
Leu His Leu Gln Gly Arg Thr Asn Ala Trp Arg Pro Arg Val Ser Ser	
1345 1350 1355 1360	
gca gag gag tgg ctg cag gtg gac ctg cag aag acg gtg aag gtc aca	4128
Ala Glu Glu Trp Leu Gln Val Asp Leu Gln Lys Thr Val Lys Val Thr	
1365 1370 1375	
ggc atc acc acc cag ggc gtg aag tcc ctg ctc agc agc atg tat gtg	4176
Gly Ile Thr Thr Gln Gly Val Lys Ser Leu Leu Ser Ser Met Tyr Val	
1380 1385 1390	
aag gag ttc ctc gtg tcc agt agt cag gac ggc cgc cgc tgg acc ctg	4224
Lys Glu Phe Leu Val Ser Ser Ser Gln Asp Gly Arg Arg Trp Thr Leu	
1395 1400 1405	
ttt ctt cag gac ggc cac acg aag gtt ttt cag ggc aat cag gac tcc	4272
Phe Leu Gln Asp Gly His Thr Lys Val Phe Gln Gly Asn Gln Asp Ser	
1410 1415 1420	
tcc acc ccc gtg gtg aac gct ctg gac ccc ccg ctg ttc acg cgc tac	4320
Ser Thr Pro Val Val Asn Ala Leu Asp Pro Pro Leu Phe Thr Arg Tyr	
1425 1430 1435 1440	
ctg agg atc cac ccc acg agc tgg gcg cag cac atc gcc ctg agg ctc	4368
Leu Arg Ile His Pro Thr Ser Trp Ala Gln His Ile Ala Leu Arg Leu	
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Glu Val Leu Gly Cys Glu Ala Gln Asp Leu Tyr	
1460 1465	

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 <211> 1467
 <212> PRT
 <213> Sus scrofa

<400> 4
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 Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
 20 25 30
 Trp Asp Tyr Arg Gln Ser Glu Leu Leu Arg Glu Leu His Val Asp Thr
 35 40 45
 Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
 50 55 60
 Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser
 65 70 75 80
 Val Ala Arg Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile
 85 90 95
 Gln Ala Glu Val Tyr Asp Thr Val Val Thr Leu Lys Asn Met Ala
 100 105 110
 Ser His Pro Val Ser Leu His Ala Val Gly Val Ser Phe Trp Lys Ser
 115 120 125
 Ser Glu Gly Ala Glu Tyr Glu Asp His Thr Ser Gln Arg Glu Lys Glu
 130 135 140
 Asp Asp Lys Val Leu Pro Gly Lys Ser Gln Thr Tyr Val Trp Gln Val
 145 150 155 160
 Leu Lys Glu Asn Gly Pro Thr Ala Ser Asp Pro Pro Cys Leu Thr Tyr
 165 170 175
 Ser Tyr Leu Ser His Val Asp Leu Val Lys Asp Leu Asn Ser Gly Leu

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Ile	Gly	Ala	Leu	Leu	Val	Cys	Arg	Glu	Gly	Ser	Leu	Thr	Arg	Glu	Arg
		180													
Thr	Gln	195	Leu	His	Glu	Phe	Val	Leu	Leu	Phe	Ala	Val	Phe	Asp	Glu
		210													
Gly	Lys	Ser	Trp	His	Ser	Ala	Arg	Asn	Asp	Ser	Trp	Thr	Arg	Ala	Met
225					230					235					240
Asp	Pro	Ala	Pro	Ala	Arg	Ala	Gln	Pro	Ala	Met	His	Thr	Val	Asn	Gly
				245					250					255	
Tyr	Val	Asn	Arg	Ser	Leu	Pro	Gly	Leu	Ile	Gly	Cys	His	Lys	Lys	Ser
			260					265					270		
Val	Tyr	Trp	His	Val	Ile	Gly	Met	Gly	Thr	Ser	Pro	Glu	Val	His	Ser
		275					280					285			
Ile	Phe	Leu	Glu	Gly	His	Thr	Phe	Leu	Val	Arg	His	His	Arg	Gln	Ala
	290					295					300				
Ser	Leu	Glu	Ile	Ser	Pro	Leu	Thr	Phe	Leu	Thr	Ala	Gln	Thr	Phe	Leu
305					310					315					320
Met	Asp	Leu	Gly	Gln	Phe	Leu	Leu	Phe	Cys	His	Ile	Ser	Ser	His	His
				325					330					335	
His	Gly	Gly	Met	Glu	Ala	His	Val	Arg	Val	Glu	Ser	Cys	Ala	Glu	Glu
			340					345					350		
Pro	Gln	Leu	Arg	Arg	Lys	Ala	Asp	Glu	Glu	Glu	Asp	Tyr	Asp	Asp	Asn
		355					360					365			
Leu	Tyr	Asp	Ser	Asp	Met	Asp	Val	Val	Arg	Leu	Asp	Gly	Asp	Asp	Val
	370					375					380				
Ser	Pro	Phe	Ile	Gln	Ile	Arg	Ser	Val	Ala	Lys	Lys	His	Pro	Lys	Thr
385					390					395					400
Trp	Val	His	Tyr	Ile	Ser	Ala	Glu	Glu	Glu	Asp	Trp	Asp	Tyr	Ala	Pro
				405					410					415	
Ala	Val	Pro	Ser	Pro	Ser	Asp	Arg	Ser	Tyr	Lys	Ser	Leu	Tyr	Leu	Asn
			420					425					430		
Ser	Gly	Pro	Gln	Arg	Ile	Gly	Arg	Lys	Tyr	Lys	Lys	Ala	Arg	Phe	Val
		435					440					445			
Ala	Tyr	Thr	Asp	Val	Thr	Phe	Lys	Thr	Arg	Lys	Ala	Ile	Pro	Tyr	Glu
	450					455					460				
Ser	Gly	Ile	Leu	Gly	Pro	Leu	Leu	Tyr	Gly	Glu	Val	Gly	Asp	Thr	Leu
465					470					475					480
Leu	Ile	Ile	Phe	Lys	Asn	Lys	Ala	Ser	Arg	Pro	Tyr	Asn	Ile	Tyr	Pro
				485					490					495	
His	Gly	Ile	Thr	Asp	Val	Ser	Ala	Leu	His	Pro	Gly	Arg	Leu	Leu	Lys
			500					505					510		
Gly	Trp	Lys	His	Leu	Lys	Asp	Met	Pro	Ile	Leu	Pro	Gly	Glu	Thr	Phe
		515					520					525			
Lys	Tyr	Lys	Trp	Thr	Val	Thr	Val	Glu	Asp	Gly	Pro	Thr	Lys	Ser	Asp
	530					535					540				
Pro	Arg	Cys	Leu	Thr	Arg	Tyr	Tyr	Ser	Ser	Ser	Ile	Asn	Leu	Glu	Lys
545					550					555					560
Asp	Leu	Ala	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile	Cys	Tyr	Lys	Glu
				565					570					575	
Ser	Val	Asp	Gln	Arg	Gly	Asn	Gln	Met	Met	Ser	Asp	Lys	Arg	Asn	Val
			580					585					590		
Ile	Leu	Phe	Ser	Val	Phe	Asp	Glu	Asn	Gln	Ser	Trp	Tyr	Leu	Ala	Glu
		595					600					605			
Asn	Ile	Gln	Arg	Phe	Leu	Pro	Asn	Pro	Asp	Gly	Leu	Gln	Pro	Gln	Asp
	610					615					620				
Pro	Glu	Phe	Gln	Ala	Ser	Asn	Ile	Met	His	Ser	Ile	Asn	Gly	Tyr	Val
625					630					635					640
Phe	Asp	Ser	Leu	Gln	Leu	Ser	Val	Cys	Leu	His	Glu	Val	Ala	Tyr	Trp
				645					650					655	
Tyr	Ile	Leu	Ser	Val	Gly	Ala	Gln	Thr	Asp	Phe	Leu	Ser	Val	Phe	Phe
			660					665					670		
Ser	Gly	Tyr	Thr	Phe	Lys	His	Lys	Met	Val	Tyr	Glu	Asp	Thr	Leu	Thr
		675					680					685			

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Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro
 690 695 700
 Gly Leu Trp Val Leu Gly Cys His Asn Ser Asp Leu Arg Asn Arg Gly
 705 710 715 720
 Met Thr Ala Leu Leu Lys Val Tyr Ser Cys Asp Arg Asp Ile Gly Asp
 725 730 735
 Tyr Tyr Asp Asn Thr Tyr Glu Asp Ile Pro Gly Phe Leu Leu Ser Gly
 740 745 750
 Lys Asn Val Ile Glu Pro Arg Ser Phe Ala Gln Asn Ser Arg Pro Pro
 755 760 765
 Ser Ala Ser Ala Pro Lys Pro Pro Val Leu Arg Arg His Gln Arg Asp
 770 775 780
 Ile Ser Leu Pro Thr Phe Gln Pro Glu Glu Asp Lys Met Asp Tyr Asp
 785 790 795 800
 Asp Ile Phe Ser Thr Glu Thr Lys Gly Glu Asp Phe Asp Ile Tyr Gly
 805 810 815
 Glu Asp Glu Asn Gln Asp Pro Arg Ser Phe Gln Lys Arg Thr Arg His
 820 825 830
 Tyr Phe Ile Ala Ala Val Glu Gln Leu Trp Asp Tyr Gly Met Ser Glu
 835 840 845
 Ser Pro Arg Ala Leu Arg Asn Arg Ala Gln Asn Gly Glu Val Pro Arg
 850 855 860
 Phe Lys Lys Val Val Phe Arg Glu Phe Ala Asp Gly Ser Phe Thr Gln
 865 870 875 880
 Pro Ser Tyr Arg Gly Glu Leu Asn Lys His Leu Gly Leu Leu Gly Pro
 885 890 895
 Tyr Ile Arg Ala Glu Val Glu Asp Asn Ile Met Val Thr Phe Lys Asn
 900 905 910
 Gln Ala Ser Arg Pro Tyr Ser Phe Tyr Ser Ser Leu Ile Ser Tyr Pro
 915 920 925
 Asp Asp Gln Glu Gln Gly Ala Glu Pro Arg His Asn Phe Val Gln Pro
 930 935 940
 Asn Glu Thr Arg Thr Tyr Phe Trp Lys Val Gln His His Met Ala Pro
 945 950 955 960
 Thr Glu Asp Glu Phe Asp Cys Lys Ala Trp Ala Tyr Phe Ser Asp Val
 965 970 975
 Asp Leu Glu Lys Asp Val His Ser Gly Leu Ile Gly Pro Leu Leu Ile
 980 985 990
 Cys Arg Ala Asn Thr Leu Asn Ala Ala His Gly Arg Gln Val Thr Val
 995 1000 1005
 Gln Glu Phe Ala Leu Phe Phe Thr Ile Phe Asp Glu Thr Lys Ser Trp
 1010 1015 1020
 Tyr Phe Thr Glu Asn Val Glu Arg Asn Cys Arg Ala Pro Cys His Leu
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 Gln Met Glu Asp Pro Thr Leu Lys Glu Asn Tyr Arg Phe His Ala Ile
 1045 1050 1055
 Asn Gly Tyr Val Met Asp Thr Leu Pro Gly Leu Val Met Ala Gln Asn
 1060 1065 1070
 Gln Arg Ile Arg Trp Tyr Leu Leu Ser Met Gly Ser Asn Glu Asn Ile
 1075 1080 1085
 His Ser Ile His Phe Ser Gly His Val Phe Ser Val Arg Lys Lys Glu
 1090 1095 1100
 Glu Tyr Lys Met Ala Val Tyr Asn Leu Tyr Pro Gly Val Phe Glu Thr
 1105 1110 1115 1120
 Val Glu Met Leu Pro Ser Lys Val Gly Ile Trp Arg Ile Glu Cys Leu
 1125 1130 1135
 Ile Gly Glu His Leu Gln Ala Gly Met Ser Thr Thr Phe Leu Val Tyr
 1140 1145 1150
 Ser Lys Glu Cys Gln Ala Pro Leu Gly Met Ala Ser Gly Arg Ile Arg
 1155 1160 1165
 Asp Phe Gln Ile Thr Ala Ser Gly Gln Tyr Gly Gln Trp Ala Pro Lys
 1170 1175 1180
 Leu Ala Arg Leu His Tyr Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys

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1185      1190      1195      1200
Asp Pro His Ser Trp Ile Lys Val Asp Leu Leu Ala Pro Met Ile Ile
      1205      1210      1215
His Gly Ile Met Thr Gln Gly Ala Arg Gln Lys Phe Ser Ser Leu Tyr
      1220      1225      1230
Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu Asp Gly Arg Asn Trp Gln
      1235      1240      1245
Ser Tyr Arg Gly Asn Ser Thr Gly Thr Leu Met Val Phe Phe Gly Asn
      1250      1255      1260
Val Asp Ala Ser Gly Ile Lys His Asn Ile Phe Asn Pro Pro Ile Val
1265      1270      1275      1280
Ala Arg Tyr Ile Arg Leu His Pro Thr His Tyr Ser Ile Arg Ser Thr
      1285      1290      1295
Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser Cys Ser Met Pro
      1300      1305      1310
Leu Gly Met Gln Asn Lys Ala Ile Ser Asp Ser Gln Ile Thr Ala Ser
      1315      1320      1325
Ser His Leu Ser Asn Ile Phe Ala Thr Trp Ser Pro Ser Gln Ala Arg
      1330      1335      1340
Leu His Leu Gln Gly Arg Thr Asn Ala Trp Arg Pro Arg Val Ser Ser
1345      1350      1355      1360
Ala Glu Glu Trp Leu Gln Val Asp Leu Gln Lys Thr Val Lys Val Thr
      1365      1370      1375
Gly Ile Thr Thr Gln Gly Val Lys Ser Leu Leu Ser Ser Met Tyr Val
      1380      1385      1390
Lys Glu Phe Leu Val Ser Ser Ser Gln Asp Gly Arg Arg Trp Thr Leu
      1395      1400      1405
Phe Leu Gln Asp Gly His Thr Lys Val Phe Gln Gly Asn Gln Asp Ser
      1410      1415      1420
Ser Thr Pro Val Val Asn Ala Leu Asp Pro Pro Leu Phe Thr Arg Tyr
1425      1430      1435      1440
Leu Arg Ile His Pro Thr Ser Trp Ala Gln His Ile Ala Leu Arg Leu
      1445      1450      1455
Glu Val Leu Gly Cys Glu Ala Gln Asp Leu Tyr
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<212> DNA
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<223> Factor VIII- Full Length

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<221> CDS
<222> (208)...(7203)

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tctccagttg aacatttgta gcaataagtc atgcaaatag agctctccac ctgcttcttt 180
ctgtgccttt tgcgattctg ctttagt gcc acc aga aga tac tac ctg ggt gca 234
Ala Thr Arg Arg Tyr Tyr Leu Gly Ala
      1      5

```

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gtg gaa ctg tca tgg gac tat atg caa agt gat ctc ggt gag ctg cct 282
Val Glu Leu Ser Trp Asp Tyr Met Gln Ser Asp Leu Gly Glu Leu Pro
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Thr	Ser	Val	Val 45	Tyr	Lys	Lys	Thr	Leu 50	Phe	Val	Glu	Phe	Thr 55	Val	His		
ctt	ttc	aac	atc	gct	aag	cca	agg	cca	ccc	tgg	atg	ggt	ctg	cta	ggt	426	
Leu	Phe	Asn 60	Ile	Ala	Lys	Pro	Arg 65	Pro	Pro	Trp	Met	Gly 70	Leu	Leu	Gly		
cct	acc	atc	cag	gct	gag	gtt	tat	gat	aca	gtg	gtc	att	aca	ctt	aag	474	
Pro	Thr 75	Ile	Gln	Ala	Glu	Val 80	Tyr	Asp	Thr	Val	Val 85	Ile	Thr	Leu	Lys		
aac	atg	gct	tcc	cat	cct	gtc	agt	ctt	cat	gct	gtt	ggt	gta	tcc	tac	522	
Asn 90	Met	Ala	Ser	His	Pro 95	Val	Ser	Leu	His	Ala 100	Val	Gly	Val	Ser	Tyr 105		
tgg	aaa	gct	tct	gag	gga	gct	gaa	tat	gat	gat	cag	acc	agt	caa	agg	570	
Trp	Lys	Ala	Ser	Glu 110	Gly	Ala	Glu	Tyr	Asp 115	Asp	Gln	Thr	Ser	Gln 120	Arg		
gag	aaa	gaa	gat	gat	aaa	gtc	ttc	cct	ggt	gga	agc	cat	aca	tat	gtc	618	
Glu	Lys	Glu	Asp 125	Asp	Lys	Val	Phe	Pro 130	Gly	Gly	Ser	His	Thr 135	Tyr	Val		
tgg	cag	gtc	ctg	aaa	gag	aat	ggt	cca	atg	gcc	tct	gac	cca	ctg	tgc	666	
Trp	Gln 140	Val	Leu	Lys	Glu	Asn	Gly 145	Pro	Met	Ala	Ser	Asp 150	Pro	Leu	Cys		
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Leu	Thr 155	Tyr	Ser	Tyr	Leu	Ser 160	His	Val	Asp	Leu	Val 165	Lys	Asp	Leu	Asn		
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Ser 170	Gly	Leu	Ile	Gly	Ala 175	Leu	Leu	Val	Cys	Arg 180	Glu	Gly	Ser	Leu	Ala 185		
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Lys	Glu	Lys	Thr	Gln 190	Thr	Leu	His	Lys	Phe 195	Ile	Leu	Leu	Phe	Ala 200	Val		
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Gln	Asp	Arg 220	Asp	Ala	Ala	Ser	Ala 225	Arg	Ala	Trp	Pro	Lys 230	Met	His	Thr		
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Val	Asn 235	Gly	Tyr	Val	Asn 240	Arg	Ser	Leu	Pro	Gly	Leu 245	Ile	Gly	Cys	His		
agg	aaa	tca	gtc	tat	tgg	cat	gtg	att	gga	atg	ggc	acc	act	cct	gaa	1002	
Arg 250	Lys	Ser	Val	Tyr	Trp 255	His	Val	Ile	Gly	Met 260	Gly	Thr	Thr	Pro	Glu 265		
gtg	cac	tca	ata	ttc	ctc	gaa	ggt	cac	aca	ttt	ctt	gtg	agg	aac	cat	1050	
Val	His	Ser	Ile	Phe 270	Leu	Glu	Gly	His	Thr 275	Phe	Leu	Val	Arg	Asn 280	His		

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aca	ctc	ttg	atg	gac	ctt	gga	cag	ttt	cta	ctg	ttt	tgt	cat	atc	tct	1146
Thr	Leu	Leu	Met	Asp	Leu	Gly	Gln	Phe	Leu	Leu	Phe	Cys	His	Ile	Ser	
		300					305					310				
tcc	cac	caa	cat	gat	ggc	atg	gaa	gct	tat	gtc	aaa	gta	gac	agc	tgt	1194
Ser	His	Gln	His	Asp	Gly	Met	Glu	Ala	Tyr	Val	Lys	Val	Asp	Ser	Cys	
	315					320					325					
cca	gag	gaa	ccc	caa	cta	cga	atg	aaa	aat	aat	gaa	gaa	gcg	gaa	gac	1242
Pro	Glu	Glu	Pro	Gln	Leu	Arg	Met	Lys	Asn	Asn	Glu	Glu	Ala	Glu	Asp	
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tat	gat	gat	gat	ctt	act	gat	tct	gaa	atg	gat	gtg	gtc	agg	ttt	gat	1290
Tyr	Asp	Asp	Asp	Leu	Thr	Asp	Ser	Glu	Met	Asp	Val	Val	Arg	Phe	Asp	
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gat	gac	aac	tct	cct	tcc	ttt	atc	caa	att	cgc	tca	gtt	gcc	aag	aag	1338
Asp	Asp	Asn	Ser	Pro	Ser	Phe	Ile	Gln	Ile	Arg	Ser	Val	Ala	Lys	Lys	
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His	Pro	Lys	Thr	Trp	Val	His	Tyr	Ile	Ala	Ala	Glu	Glu	Glu	Asp	Trp	
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gac	tat	gct	ccc	tta	gtc	ctc	gcc	ccc	gat	gac	aga	agt	tat	aaa	agt	1434
Asp	Tyr	Ala	Pro	Leu	Val	Leu	Ala	Pro	Asp	Asp	Arg	Ser	Tyr	Lys	Ser	
	395					400					405					
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Gln	Tyr	Leu	Asn	Asn	Gly	Pro	Gln	Arg	Ile	Gly	Arg	Lys	Tyr	Lys	Lys	
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Val	Arg	Phe	Met	Ala	Tyr	Thr	Asp	Glu	Thr	Phe	Lys	Thr	Arg	Glu	Ala	
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Ile	Gln	His	Glu	Ser	Gly	Ile	Leu	Gly	Pro	Leu	Leu	Tyr	Gly	Glu	Val	
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Gly	Asp	Thr	Leu	Leu	Ile	Ile	Phe	Lys	Asn	Gln	Ala	Ser	Arg	Pro	Tyr	
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Asn	Ile	Tyr	Pro	His	Gly	Ile	Thr	Asp	Val	Arg	Pro	Leu	Tyr	Ser	Arg	
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aga	tta	cca	aaa	ggt	gta	aaa	cat	ttg	aag	gat	ttt	cca	att	ctg	cca	1722
Arg	Leu	Pro	Lys	Gly	Val	Lys	His	Leu	Lys	Asp	Phe	Pro	Ile	Leu	Pro	
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gga	gaa	ata	ttc	aaa	tat	aaa	tgg	aca	gtg	act	gta	gaa	gat	ggg	cca	1770
Gly	Glu	Ile	Phe	Lys	Tyr	Lys	Trp	Thr	Val	Thr	Val	Glu	Asp	Gly	Pro	
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act	aaa	tca	gat	cct	cgg	tgc	ctg	acc	cgc	tat	tac	tct	agt	ttc	gtt	1818
Thr	Lys	Ser	Asp	Pro	Arg	Cys	Leu	Thr	Arg	Tyr	Tyr	Ser	Ser	Phe	Val	
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540 545 550	
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Cys Tyr Lys Glu Ser Val Asp Gln Arg Gly Asn Gln Ile Met Ser Asp	
555 560 565	
aag agg aat gtc atc ctg ttt tct gta ttt gat gag aac cga agc tgg	1962
Lys Arg Asn Val Ile Leu Phe Ser Val Phe Asp Glu Asn Arg Ser Trp	
570 575 580 585	
tac ctc aca gag aat ata caa cgc ttt ctc ccc aat cca gct gga gtg	2010
Tyr Leu Thr Glu Asn Ile Gln Arg Phe Leu Pro Asn Pro Ala Gly Val	
590 595 600	
cag ctt gag gat cca gag ttc caa gcc tcc aac atc atg cac agc atc	2058
Gln Leu Glu Asp Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile	
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Ser Val Phe Phe Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu	
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Asp Thr Leu Thr Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser	
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Arg Asn Arg Gly Met Thr Ala Leu Leu Lys Val Ser Ser Cys Asp Lys	
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Asn Thr Gly Asp Tyr Tyr Glu Asp Ser Tyr Glu Asp Ile Ser Ala Tyr	
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Leu Leu Ser Lys Asn Asn Ala Ile Glu Pro Arg Ser Phe Ser Gln Asn	
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Pro Glu Asn Asp Ile Glu Lys Thr Asp Pro Trp Phe Ala His Arg Thr	
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Pro Met Pro Lys Ile Gln Asn Val Ser Ser Ser Asp Leu Leu Met Leu	

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aat aaa act act tca tca aaa aac atg gaa atg gtc caa cag aaa aaa Asn Lys Thr Thr Ser Ser Lys Asn Met Glu Met Val Gln Gln Lys Lys 1070 1075 1080	3450
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aac ttg gat aat tta cat gaa aat aat aca cac aat caa gaa aaa aaa Asn Leu Asp Asn Leu His Glu Asn Asn Thr His Asn Gln Glu Lys Lys 1180 1185 1190	3786
att cag gaa gaa ata gaa aag aag gaa aca tta atc caa gag aat gta Ile Gln Glu Glu Ile Glu Lys Lys Glu Thr Leu Ile Gln Glu Asn Val 1195 1200 1205	3834
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gca gca tct tat aga aag aaa gat tct ggg gtc caa gaa agc agt cat Ala Ala Ser Tyr Arg Lys Lys Asp Ser Gly Val Gln Glu Ser Ser His 1420 1425 1430	4506
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Leu Asp Pro Leu Ala Trp Asp Asn His Tyr Gly Thr Gln Ile Pro Lys	
1565 1570 1575	
gaa gag tgg aaa tcc caa gag aag tca cca gaa aaa aca gct ttt aag	4986
Glu Glu Trp Lys Ser Gln Glu Lys Ser Pro Glu Lys Thr Ala Phe Lys	
1580 1585 1590	
aaa aag gat acc att ttg tcc ctg aac gct tgt gaa agc aat cat gca	5034
Lys Lys Asp Thr Ile Leu Ser Leu Asn Ala Cys Glu Ser Asn His Ala	
1595 1600 1605	
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Ile Ala Ala Ile Asn Glu Gly Gln Asn Lys Pro Glu Ile Glu Val Thr	
1610 1615 1620 1625	
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Trp Ala Lys Gln Gly Arg Thr Glu Arg Leu Cys Ser Gln Asn Pro Pro	
1630 1635 1640	
gtc ttg aaa cgc cat caa cgg gaa ata act cgt act act ctt cag tca	5178
Val Leu Lys Arg His Gln Arg Glu Ile Thr Arg Thr Thr Leu Gln Ser	
1645 1650 1655	
gat caa gag gaa att gac tat gat gat acc ata tca gtt gaa atg aag	5226
Asp Gln Glu Glu Ile Asp Tyr Asp Asp Thr Ile Ser Val Glu Met Lys	
1660 1665 1670	
aag gaa gat ttt gac att tat gat gag gat gaa aat cag agc ccc cgc	5274
Lys Glu Asp Phe Asp Ile Tyr Asp Glu Asp Glu Asn Gln Ser Pro Arg	
1675 1680 1685	
agc ttt caa aag aaa aca cga cac tat ttt att gct gca gtg gag agg	5322
Ser Phe Gln Lys Lys Thr Arg His Tyr Phe Ile Ala Ala Val Glu Arg	
1690 1695 1700 1705	
ctc tgg gat tat ggg atg agt agc tcc cca cat gtt cta aga aac agg	5370
Leu Trp Asp Tyr Gly Met Ser Ser Ser Pro His Val Leu Arg Asn Arg	
1710 1715 1720	
gct cag agt ggc agt gtc cct cag ttc aag aaa gtt gtt ttc cag gaa	5418
Ala Gln Ser Gly Ser Val Pro Gln Phe Lys Lys Val Val Phe Gln Glu	
1725 1730 1735	
ttt act gat ggc tcc ttt act cag ccc tta tac cgt gga gaa cta aat	5466
Phe Thr Asp Gly Ser Phe Thr Gln Pro Leu Tyr Arg Gly Glu Leu Asn	
1740 1745 1750	
gaa cat ttg gga ctc ctg ggg cca tat ata aga gca gaa gtt gaa gat	5514
Glu His Leu Gly Leu Leu Gly Pro Tyr Ile Arg Ala Glu Val Glu Asp	
1755 1760 1765	
aat atc atg gta act ttc aga aat cag gcc tct cgt ccc tat tcc ttc	5562
Asn Ile Met Val Thr Phe Arg Asn Gln Ala Ser Arg Pro Tyr Ser Phe	
1770 1775 1780 1785	
tat tct agc ctt att tct tat gag gaa gat cag agg caa gga gca gaa	5610
Tyr Ser Ser Leu Ile Ser Tyr Glu Glu Asp Gln Arg Gln Gly Ala Glu	

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cct aga aaa aac ttt gtc aag cct aat gaa acc aaa act tac ttt tgg Pro Arg Lys Asn Phe Val Lys Pro Asn Glu Thr Lys Thr Tyr Phe Trp 1805 1810 1815			5658
aaa gtg caa cat cat atg gca ccc act aaa gat gag ttt gac tgc aaa Lys Val Gln His His Met Ala Pro Thr Lys Asp Glu Phe Asp Cys Lys 1820 1825 1830			5706
gcc tgg gct tat ttc tct gat gtt gac ctg gaa aaa gat gtg cac tca Ala Trp Ala Tyr Phe Ser Asp Val Asp Leu Glu Lys Asp Val His Ser 1835 1840 1845			5754
ggc ctg att gga ccc ctt ctg gtc tgc cac act aac aca ctg aac cct Gly Leu Ile Gly Pro Leu Leu Val Cys His Thr Asn Thr Leu Asn Pro 1850 1855 1860 1865			5802
gct cat ggg aga caa gtg aca gta cag gaa ttt gct ctg ttt ttc acc Ala His Gly Arg Gln Val Thr Val Gln Glu Phe Ala Leu Phe Phe Thr 1870 1875 1880			5850
atc ttt gat gag acc aaa agc tgg tac ttc act gaa aat atg gaa aga Ile Phe Asp Glu Thr Lys Ser Trp Tyr Phe Thr Glu Asn Met Glu Arg 1885 1890 1895			5898
aac tgc agg gct ccc tgc aat atc cag atg gaa gat ccc act ttt aaa Asn Cys Arg Ala Pro Cys Asn Ile Gln Met Glu Asp Pro Thr Phe Lys 1900 1905 1910			5946
gag aat tat cgc ttc cat gca atc aat ggc tac ata atg gat aca cta Glu Asn Tyr Arg Phe His Ala Ile Asn Gly Tyr Ile Met Asp Thr Leu 1915 1920 1925			5994
cct ggc tta gta atg gct cag gat caa agg att cga tgg tat ctg ctc Pro Gly Leu Val Met Ala Gln Asp Gln Arg Ile Arg Trp Tyr Leu Leu 1930 1935 1940 1945			6042
agc atg ggc agc aat gaa aac atc cat tct att cat ttc agt gga cat Ser Met Gly Ser Asn Glu Asn Ile His Ser Ile His Phe Ser Gly His 1950 1955 1960			6090
gtg ttc act gta cga aaa aaa gag gag tat aaa atg gca ctg tac aat Val Phe Thr Val Arg Lys Lys Glu Glu Tyr Lys Met Ala Leu Tyr Asn 1965 1970 1975			6138
ctc tat cca ggt gtt ttt gag aca gtg gaa atg tta cca tcc aaa gct Leu Tyr Pro Gly Val Phe Glu Thr Val Glu Met Leu Pro Ser Lys Ala 1980 1985 1990			6186
gga att tgg cgg gtg gaa tgc ctt att ggc gag cat cta cat gct ggg Gly Ile Trp Arg Val Glu Cys Leu Ile Gly Glu His Leu His Ala Gly 1995 2000 2005			6234
atg agc aca ctt ttt ctg gtg tac agc aat aag tgt cag act ccc ctg Met Ser Thr Leu Phe Leu Val Tyr Ser Asn Lys Cys Gln Thr Pro Leu 2010 2015 2020 2025			6282
gga atg gct tct gga cac att aga gat ttt cag att aca gct tca gga Gly Met Ala Ser Gly His Ile Arg Asp Phe Gln Ile Thr Ala Ser Gly 2030 2035 2040			6330
caa tat gga cag tgg gcc cca aag ctg gcc aga ctt cat tat tcc gga			6378

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Gln Tyr Gly	Gln Trp Ala Pro Lys	Leu Ala Arg Leu His Tyr Ser Gly	
	2045	2050	2055
tca atc aat gcc tgg agc acc aag gag ccc ttt tct tgg atc aag gtg			6426
Ser Ile Asn Ala Trp Ser Thr	Lys Glu Pro Phe Ser	Trp Ile Lys Val	
	2060	2065	2070
gat ctg ttg gca cca atg att att cac ggc atc aag acc cag ggt gcc			6474
Asp Leu Leu Ala Pro Met	Ile Ile His Gly Ile	Lys Thr Gln Gly Ala	
	2075	2080	2085
cgt cag aag ttc tcc agc ctc tac atc tct cag ttt atc atc atg tat			6522
Arg Gln Lys Phe Ser Ser	Leu Tyr Ile Ser	Gln Phe Ile Ile Met Tyr	
	2090	2095	2100
agt ctt gat ggg aag aag tgg cag act tat cga gga aat tcc act gga			6570
Ser Leu Asp Gly	Lys Lys Trp Gln Thr	Tyr Arg Gly Asn Ser Thr	
	2110	2115	2120
acc tta atg gtc ttc ttt ggc aat gtg gat tca tct ggg ata aaa cac			6618
Thr Leu Met	Val Phe Phe Gly Asn	Val Asp Ser Ser Gly Ile Lys His	
	2125	2130	2135
aat att ttt aac cct cca att att gct cga tac atc cgt ttg cac cca			6666
Asn Ile Phe Asn Pro Pro	Ile Ile Ala Arg Tyr Ile	Arg Leu His Pro	
	2140	2145	2150
act cat tat agc att cgc agc act ctt cgc atg gag ttg atg ggc tgt			6714
Thr His Tyr Ser Ile Arg	Ser Thr Leu Arg Met	Glu Leu Met Gly Cys	
	2155	2160	2165
gat tta aat agt tgc agc atg cca ttg gga atg gag agt aaa gca ata			6762
Asp Leu Asn Ser Cys	Ser Met Pro Leu Gly	Met Glu Ser Lys Ala Ile	
	2170	2175	2180
tca gat gca cag att act gct tca tcc tac ttt acc aat atg ttt gcc			6810
Ser Asp Ala Gln	Ile Thr Ala Ser Ser	Tyr Phe Thr Asn Met Phe Ala	
	2190	2195	2200
acc tgg tct cct tca aaa gct cga ctt cac ctc caa ggg agg agt aat			6858
Thr Trp Ser	Pro Ser Lys Ala Arg	Leu His Leu Gln Gly Arg Ser Asn	
	2205	2210	2215
gcc tgg aga cct cag gtg aat aat cca aaa gag tgg ctg caa gtg gac			6906
Ala Trp Arg Pro Gln Val	Asn Asn Pro Lys Glu Trp	Leu Gln Val Asp	
	2220	2225	2230
ttc cag aag aca atg aaa gtc aca gga gta act act cag gga gta aaa			6954
Phe Gln Lys Thr Met Lys	Val Thr Gly Val Thr	Thr Gln Gly Val Lys	
	2235	2240	2245
tct ctg ctt acc agc atg tat gtg aag gag ttc ctc atc tcc agc agt			7002
Ser Leu Leu Thr Ser	Met Tyr Val Lys Glu	Phe Leu Ile Ser Ser	
	2250	2255	2260
caa gat ggc cat cag tgg act ctc ttt ttt cag aat ggc aaa gta aag			7050
Gln Asp Gly His	Gln Trp Thr Leu Phe	Phe Gln Asn Gly Lys Val Lys	
	2270	2275	2280
gtt ttt cag gga aat caa gac tcc ttc aca cct gtg gtg aac tct cta			7098
Val Phe Gln	Gly Asn Gln Asp Ser	Phe Thr Pro Val Val	
	2285	2290	2295

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gac cca ccg tta ctg act cgc tac ctt cga att cac ccc cag agt tgg 7146
 Asp Pro Pro Leu Leu Thr Arg Tyr Leu Arg Ile His Pro Gln Ser Trp
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gtg cac cag att gcc ctg agg atg gag gtt ctg ggc tgc gag gca cag 7194
 Val His Gln Ile Ala Leu Arg Met Glu Val Leu Gly Cys Glu Ala Gln
 2315 2320 2325

gac ctc tac tgaggggtggc cactgcagca cctgccactg ccgtcacctc 7243
 Asp Leu Tyr
 2330

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 <212> PRT
 <213> Homo sapiens

<400> 6

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 Cys Phe Ser Ala Thr Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
 20 25 30
 Trp Asp Tyr Met Gln Ser Asp Leu Gly Glu Leu Pro Val Asp Ala Arg
 35 40 45
 Phe Pro Pro Arg Val Pro Lys Ser Phe Pro Phe Asn Thr Ser Val Val
 50 55 60
 Tyr Lys Lys Thr Leu Phe Val Glu Phe Thr Val His Leu Phe Asn Ile
 65 70 75 80
 Ala Lys Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile Gln
 85 90 95
 Ala Glu Val Tyr Asp Thr Val Val Ile Thr Leu Lys Asn Met Ala Ser

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[illegible]

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Asn Ile Gln Arg Phe Leu Pro Asn Pro Ala Gly Val Gln Leu Glu Asp
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 Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val
 625 630 635 640
 Phe Asp Ser Leu Gln Leu Ser Val Cys Leu His Glu Val Ala Tyr Trp
 650 655
 Tyr Ile Leu Ser Ile Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe
 660 665 670
 Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr
 675 680 685
 Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro
 690 695 700
 Gly Leu Trp Ile Leu Gly Cys His Asn Ser Asp Phe Arg Asn Arg Gly
 705 710 715 720
 Met Thr Ala Leu Leu Lys Val Ser Ser Cys Asp Lys Asn Thr Gly Asp
 725 730 735
 Tyr Tyr Glu Asp Ser Tyr Glu Asp Ile Ser Ala Tyr Leu Leu Ser Lys
 740 745 750
 Asn Asn Ala Ile Glu Pro Arg Ser Phe Ser Gln Asn Ser Arg His Pro
 755 760 765
 Ser Thr Arg Gln Lys Gln Phe Asn Ala Thr Thr Ile Pro Glu Asn Asp
 770 775 780
 Ile Glu Lys Thr Asp Pro Trp Phe Ala His Arg Thr Pro Met Pro Lys
 785 790 795 800
 Ile Gln Asn Val Ser Ser Ser Asp Leu Leu Met Leu Leu Arg Gln Ser
 805 810 815
 Pro Thr Pro His Gly Leu Ser Leu Ser Asp Leu Gln Glu Ala Lys Tyr
 820 825 830
 Glu Thr Phe Ser Asp Asp Pro Ser Pro Gly Ala Ile Asp Ser Asn Asn
 835 840 845
 Ser Leu Ser Glu Met Thr His Phe Arg Pro Gln Leu His His Ser Gly
 850 855 860
 Asp Met Val Phe Thr Pro Glu Ser Gly Leu Gln Leu Arg Leu Asn Glu
 865 870 875 880
 Lys Leu Gly Thr Thr Ala Ala Thr Glu Leu Lys Lys Leu Asp Phe Lys
 885 890 895
 Val Ser Ser Thr Ser Asn Asn Leu Ile Ser Thr Ile Pro Ser Asp Asn
 900 905 910
 Leu Ala Ala Gly Thr Asp Asn Thr Ser Ser Leu Gly Pro Pro Ser Met
 915 920 925
 Pro Val His Tyr Asp Ser Gln Leu Asp Thr Thr Leu Phe Gly Lys Lys
 930 935 940
 Ser Ser Pro Leu Thr Glu Ser Gly Gly Pro Leu Ser Leu Ser Glu Glu
 945 950 955 960
 Asn Asn Asp Ser Lys Leu Leu Glu Ser Gly Leu Met Asn Ser Gln Glu
 965 970 975
 Ser Ser Trp Gly Lys Asn Val Ser Ser Thr Glu Ser Gly Arg Leu Phe
 980 985 990
 Lys Gly Lys Arg Ala His Gly Pro Ala Leu Leu Thr Lys Asp Asn Ala
 995 1000 1005
 Leu Phe Lys Val Ser Ile Ser Leu Leu Lys Thr Asn Lys Thr Ser
 1010 1015 1020
 Asn Asn Ser Ala Thr Asn Arg Lys Thr His Ile Asp Gly Pro Ser
 1025 1030 1035
 Leu Leu Ile Glu Asn Ser Pro Ser Val Trp Gln Asn Ile Leu Glu
 1040 1045 1050
 Ser Asp Thr Glu Phe Lys Lys Val Thr Pro Leu Ile His Asp Arg
 1055 1060 1065
 Met Leu Met Asp Lys Asn Ala Thr Ala Leu Arg Leu Asn His Met
 1070 1075 1080
 Ser Asn Lys Thr Thr Ser Ser Lys Asn Met Glu Met Val Gln Gln
 1085 1090 1095
 Lys Lys Glu Gly Pro Ile Pro Pro Asp Ala Gln Asn Pro Asp Met

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1100	Ser Phe	Phe Lys Met Leu	1105	Phe	Leu Pro Glu Ser	1110	Ala	Arg Trp Ile
1115	Gln Arg	Thr His Gly Lys	1120	Asn	Ser Leu Asn Ser	1125	Gly	Gln Gly Pro
1130	Ser Pro	Lys Gln Leu Val	1135	Ser	Leu Gly Pro Glu	1140	Lys	Ser Val Glu
1145	Gly Gln	Asn Phe Leu Ser	1150	Glu	Lys Asn Lys Val	1155	Val	Val Gly Lys
1160	Gly Glu	Phe Thr Lys Asp	1165	Val	Gly Leu Lys Glu	1170	Met	Val Phe Pro
1175	Ser Ser	Arg Asn Leu Phe	1180	Leu	Thr Asn Leu Asp	1185	Asn	Leu His Glu
1190	Asn Asn	Thr His Asn Gln	1195	Glu	Lys Lys Ile Gln	1200	Glu	Glu Ile Glu
1205	Lys Lys	Glu Thr Leu Ile	1210	Gln	Glu Asn Val Val	1215	Leu	Pro Gln Ile
1220	His Thr	Val Thr Gly Thr	1225	Lys	Asn Phe Met Lys	1230	Asn	Leu Phe Leu
1235	Leu Ser	Thr Arg Gln Asn	1240	Val	Glu Gly Ser Tyr	1245	Glu	Gly Ala Tyr
1250	Ala Pro	Val Leu Gln Asp	1255	Phe	Arg Ser Leu Asn	1260	Asp	Ser Thr Asn
1265	Arg Thr	Lys Lys His Thr	1270	Ala	His Phe Ser Lys	1275	Lys	Gly Glu Glu
1280	Glu Asn	Leu Glu Gly Leu	1285	Gly	Asn Gln Thr Lys	1290	Gln	Ile Val Glu
1295	Lys Tyr	Ala Cys Thr Thr	1300	Arg	Ile Ser Pro Asn	1305	Thr	Ser Gln Gln
1310	Asn Phe	Val Thr Gln Arg	1315	Ser	Lys Arg Ala Leu	1320	Lys	Gln Phe Arg
1325	Leu Pro	Leu Glu Glu Thr	1330	Glu	Leu Glu Lys Arg	1335	Ile	Ile Val Asp
1340	Asp Thr	Ser Thr Gln Trp	1345	Ser	Lys Asn Met Lys	1350	His	Leu Thr Pro
1355	Ser Thr	Leu Thr Gln Ile	1360	Asp	Tyr Asn Glu Lys	1365	Glu	Lys Gly Ala
1370			1375			1380		

1385	Ile Thr	Gln Ser Pro Leu	1390	Ser	Asp Cys Leu Thr	1395	Arg	Ser His Ser
1400	Ile Pro	Gln Ala Asn Arg	1405	Ser	Pro Leu Pro Ile	1410	Ala	Lys Val Ser
1415	Ser Phe	Pro Ser Ile Arg	1420	Pro	Ile Tyr Leu Thr	1425	Arg	Val Leu Phe
1430	Gln Asp	Asn Ser Ser His	1435	Leu	Pro Ala Ala Ser	1440	Tyr	Arg Lys Lys
1445	Asp Ser	Gly Val Gln Glu	1450	Ser	Ser His Phe Leu	1455	Gln	Gly Ala Lys
1460	Lys Asn	Asn Leu Ser Leu	1465	Ala	Ile Leu Thr Leu	1470	Glu	Met Thr Gly
1475	Asp Gln	Arg Glu Val Gly	1480	Ser	Leu Gly Thr Ser	1485	Ala	Thr Asn Ser
1490	Val Thr	Tyr Lys Lys Val	1495	Glu	Asn Thr Val Leu	1500	Pro	Lys Pro Asp
1505	Leu Pro	Lys Thr Ser Gly	1510	Lys	Val Glu Leu Leu	1515	Pro	Lys Val His
1520	Ile Tyr	Gln Lys Asp Leu	1525	Phe	Pro Thr Glu Thr	1530	Ser	Asn Gly Ser
1535	Pro Gly	His Leu Asp Leu	1540	Val	Glu Gly Ser Leu	1545	Leu	Gln Gly Thr
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Pro	Phe	Leu	Arg	Val	Ala	Thr	Glu	Ser	Ser	Ala	Lys	Thr	Pro	Ser
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Lys	Leu	Leu	Asp	Pro	Leu	Ala	Trp	Asp	Asn	His	Tyr	Gly	Thr	Gln
	1580					1585					1590			
Ile	Pro	Lys	Glu	Glu	Trp	Lys	Ser	Gln	Glu	Lys	Ser	Pro	Glu	Lys
	1595					1600					1605			
Thr	Ala	Phe	Lys	Lys	Lys	Asp	Thr	Ile	Leu	Ser	Leu	Asn	Ala	Cys
	1610					1615					1620			
Glu	Ser	Asn	His	Ala	Ile	Ala	Ala	Ile	Asn	Glu	Gly	Gln	Asn	Lys
	1625					1630					1635			
Pro	Glu	Ile	Glu	Val	Thr	Trp	Ala	Lys	Gln	Gly	Arg	Thr	Glu	Arg
	1640					1645					1650			
Leu	Cys	Ser	Gln	Asn	Pro	Pro	Val	Leu	Lys	Arg	His	Gln	Arg	Glu
	1655					1660					1665			
Ile	Thr	Arg	Thr	Thr	Leu	Gln	Ser	Asp	Gln	Glu	Glu	Ile	Asp	Tyr
	1670					1675					1680			
Asp	Asp	Thr	Ile	Ser	Val	Glu	Met	Lys	Lys	Glu	Asp	Phe	Asp	Ile
	1685					1690					1695			
Tyr	Asp	Glu	Asp	Glu	Asn	Gln	Ser	Pro	Arg	Ser	Phe	Gln	Lys	Lys
	1700					1705					1710			
Thr	Arg	His	Tyr	Phe	Ile	Ala	Ala	Val	Glu	Arg	Leu	Trp	Asp	Tyr
	1715					1720					1725			
Gly	Met	Ser	Ser	Ser	Pro	His	Val	Leu	Arg	Asn	Arg	Ala	Gln	Ser
	1730					1735					1740			
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	1745					1750					1755			
Asp	Gly	Ser	Phe	Thr	Gln	Pro	Leu	Tyr	Arg	Gly	Glu	Leu	Asn	Glu
	1760					1765					1770			
His	Leu	Gly	Leu	Leu	Gly	Pro	Tyr	Ile	Arg	Ala	Glu	Val	Glu	Asp
	1775					1780					1785			
Asn	Ile	Met	Val	Thr	Phe	Arg	Asn	Gln	Ala	Ser	Arg	Pro	Tyr	Ser
	1790					1795					1800			
Phe	Tyr	Ser	Ser	Leu	Ile	Ser	Tyr	Glu	Glu	Asp	Gln	Arg	Gln	Gly
	1805					1810					1815			
Ala	Glu	Pro	Arg	Lys	Asn	Phe	Val	Lys	Pro	Asn	Glu	Thr	Lys	Thr
	1820					1825					1830			
Tyr	Phe	Trp	Lys	Val	Gln	His	His	Met	Ala	Pro	Thr	Lys	Asp	Glu
	1835					1840					1845			
Phe	Asp	Cys	Lys	Ala	Trp	Ala	Tyr	Phe	Ser	Asp	Val	Asp	Leu	Glu
	1850					1855					1860			
Lys	Asp	Val	His	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Val	Cys	His
	1865					1870					1875			
Thr	Asn	Thr	Leu	Asn	Pro	Ala	His	Gly	Arg	Gln	Val	Thr	Val	Gln
	1880					1885					1890			
Glu	Phe	Ala	Leu	Phe	Phe	Thr	Ile	Phe	Asp	Glu	Thr	Lys	Ser	Trp
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Tyr	Phe	Thr	Glu	Asn	Met	Glu	Arg	Asn	Cys	Arg	Ala	Pro	Cys	Asn
	1910					1915					1920			
Ile	Gln	Met	Glu	Asp	Pro	Thr	Phe	Lys	Glu	Asn	Tyr	Arg	Phe	His
	1925					1930					1935			
Ala	Ile	Asn	Gly	Tyr	Ile	Met	Asp	Thr	Leu	Pro	Gly	Leu	Val	Met
	1940					1945					1950			
Ala	Gln	Asp	Gln	Arg	Ile	Arg	Trp	Tyr	Leu	Leu	Ser	Met	Gly	Ser
	1955					1960					1965			
Asn	Glu	Asn	Ile	His	Ser	Ile	His	Phe	Ser	Gly	His	Val	Phe	Thr
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Val	Arg	Lys	Lys	Glu	Glu	Tyr	Lys	Met	Ala	Leu	Tyr	Asn	Leu	Tyr
	1985					1990					1995			
Pro	Gly	Val	Phe	Glu	Thr	Val	Glu	Met	Leu	Pro	Ser	Lys	Ala	Gly
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Ile	Trp	Arg	Val	Glu	Cys	Leu	Ile	Gly	Glu	His	Leu	His	Ala	Gly
	2015					2020					2025			
Met	Ser	Thr	Leu	Phe	Leu	Val	Tyr	Ser	Asn	Lys	Cys	Gln	Thr	Pro

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Ser Gly Gln Tyr Gly Gln	Trp Ala Pro Lys Leu	Ala Arg Leu His
2060	2065	2070
Tyr Ser Gly Ser Ile Asn	Ala Trp Ser Thr Lys	Glu Pro Phe Ser
2075	2080	2085
Trp Ile Lys Val Asp Leu	Leu Ala Pro Met Ile	Ile His Gly Ile
2090	2095	2100
Lys Thr Gln Gly Ala Arg	Gln Lys Phe Ser Ser	Leu Tyr Ile Ser
2105	2110	2115
Gln Phe Ile Ile Met Tyr	Ser Leu Asp Gly Lys	Lys Trp Gln Thr
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	Asp	Met	Pro	Val	His	Ser	Ser	Lys	Leu	915	Ser	Thr	Thr	Ala	Phe	Gly			
	Lys	Lys	Ala	Tyr	Ser	Leu	Val	Gly	Ser	930	His	Val	Pro	Leu	Asn	Ala	Ser		
	Glu	Glu	Asn	Ser	Asp	Ser	Asn	Ile	Leu	945	Asp	Ser	Thr	Leu	Met	Tyr	Ser		
	Gln	Glu	Ser	Leu	Pro	Arg	Asp	Asn	Ile	965	Leu	Ser	Ile	Glu	Asn	Asp	Arg		
	Leu	Leu	Arg	Glu	Lys	Arg	Phe	His	Gly	980	Ile	Ala	Leu	Leu	Thr	Lys	Asp		
	Asn	Thr	Leu	Phe	Lys	Asp	Asn	Val	Ser	995	Leu	Met	Lys	Thr	Asn	Lys	Thr		
	Tyr	Asn	His	Ser	Thr	Thr	Asn	Glu	Lys	1010	Leu	His	Thr	Glu	Ser	Pro	Thr		
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Asn Ser Glu Ile Gln Glu Val Thr Ala Leu Ile His Asp Gly Thr Leu
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 1090 1095 1100
 Pro Ile Pro Gln Asp Glu Glu Asn Thr Ile Met Pro Phe Ser Lys Met
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 Leu Phe Leu Ser Glu Ser Ser Asn Trp Phe Lys Lys Thr Asn Gly Asn
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 Lys Asp Met Ala Phe Pro His Asn Met Ser Ile Phe Leu Thr Thr Leu
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 Ser Asn Val His Glu Asn Gly Arg His Asn Gln Glu Lys Asn Ile Gln
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 Glu Glu Ile Glu Lys Glu Ala Leu Ile Glu Glu Lys Val Val Leu Pro
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 Gln Val His Glu Ala Thr Gly Ser Lys Asn Phe Leu Lys Asp Ile Leu
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 Val Leu Gln Asn Ile Thr Ser Ile Asn Asn Ser Thr Asn Thr Val Gln
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 Glu Ser Asn Asn Phe Leu Lys Glu Thr Lys Ile Asn Asn Pro Ser Leu
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 Gly Glu Ser Ile Lys Gly Lys Thr Glu Ser Ser Lys Asn Thr Arg Ser
 1540 1545 1550
 Lys Leu Leu Asn His His Ala Trp Asp Tyr His Tyr Ala Ala Gln Ile

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 Ile Lys Gln Glu Asp Thr Ile Leu Ser Leu Arg Pro His Gly Asn Ser
 1585 1590 1595 1600
 His Ser Ile Gly Ala Asn Glu Lys Gln Asn Trp Pro Gln Arg Glu Thr
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 Thr Trp Val Lys Gln Gly Gln Thr Gln Arg Thr Cys Ser Gln Ile Pro
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 Pro Val Leu Lys Arg His Gln Arg Glu Leu Ser Ala Phe Gln Ser Glu
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 Gln Glu Ala Thr Asp Tyr Asp Asp Ala Ile Thr Ile Glu Thr Ile Glu
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 Asp Phe Asp Ile Tyr Ser Glu Asp Ile Lys Gln Gly Pro Arg Ser Phe
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 1700 1705 1710
 Asp Asn Val Pro Gln Phe Lys Lys Val Val Phe Gln Glu Phe Thr Asp
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 Gly Ser Phe Ser Gln Pro Leu Tyr Arg Gly Glu Leu Asn Glu His Leu
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 Gly Leu Leu Gly Pro Tyr Ile Arg Ala Glu Val Glu Asp Asn Ile Met
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 Val Thr Phe Lys Asn Gln Ala Ser Arg Pro Tyr Ser Phe Tyr Ser Ser
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 Phe Val Lys Pro Asn Glu Thr Lys Ile Tyr Phe Trp Lys Val Gln His
 1795 1800 1805
 His Met Ala Pro Thr Glu Asp Glu Phe Asp Cys Lys Ala Trp Ala Tyr
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 Pro Leu Leu Ile Cys His Ala Asn Thr Leu Asn Pro Ala His Gly Arg
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 Gln Val Ser Val Gln Glu Phe Ala Leu Leu Phe Thr Ile Phe Asp Glu
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 Thr Lys Ser Trp Tyr Phe Thr Glu Asn Val Lys Arg Asn Cys Lys Thr
 1875 1880 1885
 Pro Cys Asn Phe Gln Met Glu Asp Pro Thr Leu Lys Glu Asn Tyr Arg
 1890 1895 1900
 Phe His Ala Ile Asn Gly Tyr Val Met Asp Thr Leu Pro Gly Leu Val
 1905 1910 1915 1920
 Met Ala Gln Asp Gln Arg Ile Arg Trp Tyr Leu Leu Ser Met Gly Asn
 1925 1930 1935
 Asn Glu Asn Ile Gln Ser Ile His Phe Ser Gly His Val Phe Thr Val
 1940 1945 1950
 Arg Lys Lys Glu Glu Tyr Lys Met Ala Val Tyr Asn Leu Tyr Pro Gly
 1955 1960 1965
 Val Phe Glu Thr Leu Glu Met Ile Pro Ser Arg Ala Gly Ile Trp Arg
 1970 1975 1980
 Val Glu Cys Leu Ile Gly Glu His Leu Gln Ala Gly Met Ser Thr Leu
 1985 1990 1995 2000
 Phe Leu Val Tyr Ser Lys Gln Cys Gln Ile Pro Leu Gly Met Ala Ser
 2005 2010 2015
 Gly Ser Ile Arg Asp Phe Gln Ile Thr Ala Ser Gly His Tyr Gly Gln
 2020 2025 2030
 Trp Ala Pro Asn Leu Ala Arg Leu His Tyr Ser Gly Ser Ile Asn Ala
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 2100 2105 2110
 Phe Phe Gly Asn Val Asp Ser Ser Gly Ile Lys His Asn Ser Phe Asn
 2115 2120 2125
 Pro Pro Ile Ile Ala Arg Tyr Ile Arg Leu His Pro Thr His Ser Ser
 2130 2135 2140
 Ile Arg Ser Thr Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser
 2145 2150 2155 2160
 Cys Ser Ile Pro Leu Gly Met Glu Ser Lys Val Ile Ser Asp Thr Gln
 2165 2170 2175
 Ile Thr Ala Ser Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp Ser Pro
 2180 2185 2190
 Ser Gln Ala Arg Leu His Leu Gln Gly Arg Thr Asn Ala Trp Arg Pro
 2195 2200 2205
 Gln Val Asn Asp Pro Lys Gln Trp Leu Gln Val Asp Leu Gln Lys Thr
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 Met Lys Val Thr Gly Ile Ile Thr Gln Gly Val Lys Ser Leu Phe Thr
 2225 2230 2235 2240
 Ser Met Phe Val Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp Gly His
 2245 2250 2255
 His Trp Thr Gln Ile Leu Tyr Asn Gly Lys Val Lys Val Phe Gln Gly
 2260 2265 2270
 Asn Gln Asp Ser Ser Thr Pro Met Met Asn Ser Leu Asp Pro Pro Leu
 2275 2280 2285
 Leu Thr Arg Tyr Leu Arg Ile His Pro Gln Ile Trp Glu His Gln Ile
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SEQUENCE LISTING 13097-3

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 (HSQ)

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tgc ttt agt gcc acc aga aga tac tac ctg ggt gca gtg gaa ctg tca	96
Cys Phe Ser Ala Thr Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser	
20 25 30	
tgg gac tat atg caa agt gat ctc ggt gag ctg cct gtg gac gca aga	144
Trp Asp Tyr Met Gln Ser Asp Leu Gly Glu Leu Pro Val Asp Ala Arg	
35 40 45	
ttt cct cct aga gtg cca aaa tct ttt cca ttc aac acc tca gtc gtg	192
Phe Pro Pro Arg Val Pro Lys Ser Phe Pro Phe Asn Thr Ser Val Val	
50 55 60	
tac aaa aag act ctg ttt gta gaa ttc acg gtt cac ctt ttc aac atc	240
Tyr Lys Lys Thr Leu Phe Val Glu Phe Thr Val His Leu Phe Asn Ile	
65 70 75 80	
gct aag cca agg cca ccc tgg atg ggt ctg cta ggt cct acc atc cag	288
Ala Lys Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile Gln	
85 90 95	
gct gag gtt tat gat aca gtg gtc att aca ctt aag aac atg gct tcc	336
Ala Glu Val Tyr Asp Thr Val Val Ile Thr Leu Lys Asn Met Ala Ser	
100 105 110	
cat cct gtc agt ctt cat gct gtt ggt gta tcc tac tgg aaa gct tct	384
His Pro Val Ser Leu His Ala Val Gly Val Ser Tyr Trp Lys Ala Ser	
115 120 125	
gag gga gct gaa tat gat gat cag acc agt caa agg gag aaa gaa gat	432
Glu Gly Ala Glu Tyr Asp Asp Gln Thr Ser Gln Arg Glu Lys Glu Asp	
130 135 140	
gat aaa gtc ttc cct ggt gga agc cat aca tat gtc tgg cag gtc ctg	480

SEQUENCE LISTING 13097-3

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tat Tyr	ctt Leu	tct Ser	cat His 180	gtg Val	gac Asp	ctg Leu	gta Val	aaa Lys 185	gac Asp	ttg Leu	aat Asn	tca Ser	ggc Gly 190	ctc Leu	att Ile	576
gga Gly	gcc Ala	cta Leu 195	cta Leu	gta Val	tgt Cys	aga Arg	gaa Glu 200	ggg Gly	agt Ser	ctg Leu	gcc Ala	aag Lys 205	gaa Glu	aag Lys	aca Thr	624
cag Gln	acc Thr 210	ttg Leu	cac His	aaa Lys	ttt Phe	ata Ile 215	cta Leu	ctt Leu	ttt Phe	gct Ala	gta Val 220	ttt Phe	gat Asp	gaa Glu	ggg Gly	672
aaa Lys 225	agt Ser	tgg Trp	cac His	tca Ser	gaa Glu 230	aca Thr	aag Lys	aac Asn	tcc Ser	ttg Leu 235	atg Met	cag Gln	gat Asp	agg Arg	gat Asp 240	720
gct Ala	gca Ala	tct Ser	gct Ala	cgg Arg 245	gcc Ala	tgg Trp	cct Pro	aaa Lys	atg Met 250	cac His	aca Thr	gtc Val	aat Asn	ggg Gly 255	tat Tyr	768
gta Val	aac Asn	agg Arg	tct Ser 260	ctg Leu	cca Pro	ggt Gly	ctg Leu	att Ile 265	gga Gly	tgc Cys	cac His	agg Arg	aaa Lys 270	tca Ser	gtc Val	816
tat Tyr	tgg Trp	cat His 275	gtg Val	att Ile	gga Gly	atg Met	ggc Gly 280	acc Thr	act Thr	cct Pro	gaa Glu	gtg Val 285	cac His	tca Ser	ata Ile	864
ttc Phe	ctc Leu 290	gaa Glu	ggt Gly	cac His	aca Thr	ttt Phe 295	ctt Leu	gtg Val	agg Arg	aac Asn	cat His 300	cgc Arg	cag Gln	gcg Ala	tcc Ser	912
ttg Leu 305	gaa Glu	atc Ile	tcg Ser	cca Pro	ata Ile 310	act Thr	ttc Phe	ctt Leu	act Thr	gct Ala 315	caa Gln	aca Thr	ctc Leu	ttg Leu	atg Met 320	960
gac Asp	ctt Leu	gga Gly	cag Gln	ttt Phe 325	cta Leu	ctg Leu	ttt Phe	tgt Cys	cat His 330	atc Ile	tct Ser	tcc Ser	cac His	caa Gln 335	cat His	1008
gat Asp	ggc Gly	atg Met	gaa Glu 340	gct Ala	tat Tyr	gtc Val	aaa Lys	gta Val 345	gac Asp	agc Ser	tgt Cys	cca Pro	gag Glu 350	gaa Glu	ccc Pro	1056
caa Gln	cta Leu	cga Arg 355	atg Met	aaa Lys	aat Asn	aat Asn	gaa Glu 360	gaa Glu	gcg Ala	gaa Glu	gac Asp	tat Tyr 365	gat Asp	gat Asp	gat Asp	1104
ctt Leu	act Thr 370	gat Asp	tct Ser	gaa Glu	atg Met	gat Asp 375	gtg Val	gtc Val	agg Arg	ttt Phe	gat Asp 380	gat Asp	gac Asp	aac Asn	tct Ser	1152
cct Pro 385	tcc Ser	ttt Phe	atc Ile	caa Gln	att Ile 390	cgc Arg	tca Ser	gtt Val	gcc Ala	aag Lys 395	aag Lys	cat His	cct Pro	aaa Lys	act Thr 400	1200

SEQUENCE LISTING 13097-3

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Trp Val His Tyr Ile Ala Ala Glu Glu Glu Asp Trp Asp Tyr Ala Pro	
405 410 415	
tta gtc ctc gcc ccc gat gac aga agt tat aaa agt caa tat ttg aac	1296
Leu Val Leu Ala Pro Asp Asp Arg Ser Tyr Lys Ser Gln Tyr Leu Asn	
420 425 430	
aat ggc cct cag cgg att ggt agg aag tac aaa aaa gtc cga ttt atg	1344
Asn Gly Pro Gln Arg Ile Gly Arg Lys Tyr Lys Lys Val Arg Phe Met	
435 440 445	
gca tac aca gat gaa acc ttt aag acg cgt gaa gct att cag cat gaa	1392
Ala Tyr Thr Asp Glu Thr Phe Lys Thr Arg Glu Ala Ile Gln His Glu	
450 455 460	
tca gga atc ttg gga cct tta ctt tat ggg gaa gtt gga gac aca ctg	1440
Ser Gly Ile Leu Gly Pro Leu Leu Tyr Gly Glu Val Gly Asp Thr Leu	
465 470 475 480	
ttg att ata ttt aag aat caa gca agc aga cca tat aac atc tac cct	1488
Leu Ile Ile Phe Lys Asn Gln Ala Ser Arg Pro Tyr Asn Ile Tyr Pro	
485 490 495	
cac gga atc act gat gtc cgt cct ttg tat tca agg aga tta cca aaa	1536
His Gly Ile Thr Asp Val Arg Pro Leu Tyr Ser Arg Arg Leu Pro Lys	
500 505 510	
ggt gta aaa cat ttg aag gat ttt cca att ctg cca gga gaa ata ttc	1584
Gly Val Lys His Leu Lys Asp Phe Pro Ile Leu Pro Gly Glu Ile Phe	
515 520 525	
aaa tat aaa tgg aca gtg act gta gaa gat ggg cca act aaa tca gat	1632
Lys Tyr Lys Trp Thr Val Thr Val Glu Asp Gly Pro Thr Lys Ser Asp	
530 535 540	
ccg cgg tgc ctg acc cgc tat tac tct agt ttc gtt aat atg gag aga	1680
Pro Arg Cys Leu Thr Arg Tyr Tyr Ser Ser Phe Val Asn Met Glu Arg	
545 550 555 560	
gat cta gct tca gga ctc att ggc cct ctc ctc atc tgc tac aaa gaa	1728
Asp Leu Ala Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Tyr Lys Glu	
565 570 575	
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Ser Val Asp Gln Arg Gly Asn Gln Ile Met Ser Asp Lys Arg Asn Val	
580 585 590	
atc ctg ttt tct gta ttt gat gag aac cga agc tgg tac ctc aca gag	1824
Ile Leu Phe Ser Val Phe Asp Glu Asn Arg Ser Trp Tyr Leu Thr Glu	
595 600 605	
aat ata caa cgc ttt ctc ccc aat cca gct gga gtg cag ctt gag gat	1872
Asn Ile Gln Arg Phe Leu Pro Asn Pro Ala Gly Val Gln Leu Glu Asp	
610 615 620	
cca gag ttc caa gcc tcc aac atc atg cac agc atc aat ggc tat gtt	1920
Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val	
625 630 635 640	
ttt gat agt ttg cag ttg tca gtt tgt ttg cat gag gtg gca tac tgg	1968
Phe Asp Ser Leu Gln Leu Ser Val Cys Leu His Glu Val Ala Tyr Trp	
645 650 655	

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tac att cta agc att gga gca cag act gac ttc ctt tct gtc ttc ttc	2016
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Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr	
cta ttc cca ttc tca gga gaa act gtc ttc atg tcg atg gaa aac cca	2112
Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro	
ggc cta tgg att ctg ggg tgc cac aac tca gac ttt cgg aac aga ggc	2160
Gly Leu Trp Ile Leu Gly Cys His Asn Ser Asp Phe Arg Asn Arg Gly	
atg acc gcc tta ctg aag gtt tct agt tgt gac aag aac act ggt gat	2208
Met Thr Ala Leu Leu Lys Val Ser Ser Cys Asp Lys Asn Thr Gly Asp	
tat tac gag gac agt tat gaa gat att tca gca tac ttg ctg agt aaa	2256
Tyr Tyr Glu Asp Ser Tyr Glu Asp Ile Ser Ala Tyr Leu Leu Ser Lys	
aac aat gcc att gaa cct agg agc ttc tct cag aat cca cca gtc ttg	2304
Asn Asn Ala Ile Glu Pro Arg Ser Phe Ser Gln Asn Pro Pro Val Leu	
aaa cgc cat caa cgg gaa ata act cgt act act ctt cag tca gat caa	2352
Lys Arg His Gln Arg Glu Ile Thr Arg Thr Thr Leu Gln Ser Asp Gln	
gag gaa att gac tat gat gat acc ata tca gtt gaa atg aag aag gaa	2400
Glu Glu Ile Asp Tyr Asp Asp Thr Ile Ser Val Glu Met Lys Lys Glu	
gat ttt gac att tat gat gag gat gaa aat cag agc ccc cgc agc ttt	2448
Asp Phe Asp Ile Tyr Asp Glu Asp Glu Asn Gln Ser Pro Arg Ser Phe	
caa aag aaa aca cga cac tat ttt att gct gca gtg gag agg ctc tgg	2496
Gln Lys Lys Thr Arg His Tyr Phe Ile Ala Ala Val Glu Arg Leu Trp	
gat tat ggg atg agt agc tcc cca cat gtt cta aga aac agg gct cag	2544
Asp Tyr Gly Met Ser Ser Pro His Val Leu Arg Asn Arg Ala Gln	
agt ggc agt gtc cct cag ttc aag aaa gtt gtt ttc cag gaa ttt act	2592
Ser Gly Ser Val Pro Gln Phe Lys Lys Val Val Phe Gln Glu Phe Thr	
gat ggc tcc ttt act cag ccc tta tac cgt gga gaa cta aat gaa cat	2640
Asp Gly Ser Phe Thr Gln Pro Leu Tyr Arg Gly Glu Leu Asn Glu His	
ttg gga ctc ctg ggg cca tat ata aga gca gaa gtt gaa gat aat atc	2688
Leu Gly Leu Leu Gly Pro Tyr Ile Arg Ala Glu Val Glu Asp Asn Ile	
atg gta act ttc aga aat cag gcc tct cgt ccc tat tcc ttc tat tct	2736
Met Val Thr Phe Arg Asn Gln Ala Ser Arg Pro Tyr Ser Phe Tyr Ser	

SEQUENCE LISTING 13097-3
905 910

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caa cat cat atg gca ccc act aaa gat gag ttt gac tgc aaa gcc tgg Gln His His Met Ala Pro Thr Lys Asp Glu Phe Asp Cys Lys Ala Trp 945 950 955 960			2880
gct tat ttc tct gat gtt gac ctg gaa aaa gat gtg cac tca ggc ctg Ala Tyr Phe Ser Asp Val Asp Leu Glu Lys Asp Val His Ser Gly Leu 965 970 975			2928
att gga ccc ctt ctg gtc tgc cac act aac aca ctg aac cct gct cat Ile Gly Pro Leu Leu Val Cys His Thr Asn Thr Leu Asn Pro Ala His 980 985 990			2976
ggg aga caa gtg aca gta cag gaa ttt gct ctg ttt ttc acc atc ttt Gly Arg Gln Val Thr Val Gln Glu Phe Ala Leu Phe Phe Thr Ile Phe 995 1000 1005			3024
gat gag acc aaa agc tgg tac ttc act gaa aat atg gaa aga aac tgc Asp Glu Thr Lys Ser Trp Tyr Phe Thr Glu Asn Met Glu Arg Asn Cys 1010 1015 1020			3072
agg gct ccc tgc aat atc cag atg gaa gat ccc act ttt aaa gag aat Arg Ala Pro Cys Asn Ile Gln Met Glu Asp Pro Thr Phe Lys Glu Asn 1025 1030 1035 1040			3120
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aca ctt ttt ctg gtg tac agc aat aag tgt cag act ccc ctg gga atg Thr Leu Phe Leu Val Tyr Ser Asn Lys Cys Gln Thr Pro Leu Gly Met 1140 1145 1150			3456
gct tct gga cac att aga gat ttt cag att aca gct tca gga caa tat			3504

SEQUENCE LISTING 13097-3

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Gly Gln Trp Ala Pro Lys Leu Ala Arg Leu His Tyr Ser Gly Ser Ile		
1170	1175	1180
aat gcc tgg agc acc aag gag ccc ttt tct tgg atc aag gtg gat ctg		3600
Asn Ala Trp Ser Thr Lys Glu Pro Phe Ser Trp Ile Lys Val Asp Leu		
1185	1190	1200
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Leu Ala Pro Met Ile Ile His Gly Ile Lys Thr Gln Gly Ala Arg Gln		
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aag ttc tcc agc ctc tac atc tct cag ttt atc atc atg tat agt ctt		3696
Lys Phe Ser Ser Leu Tyr Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu		
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gat ggg aag aag tgg cag act tat cga gga aat tcc act gga acc tta		3744
Asp Gly Lys Lys Trp Gln Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu		
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atg gtc ttc ttt ggc aat gtg gat tca tct ggg ata aaa cac aat att		3792
Met Val Phe Phe Gly Asn Val Asp Ser Ser Gly Ile Lys His Asn Ile		
	1250	1260
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Phe Asn Pro Pro Ile Ile Ala Arg Tyr Ile Arg Leu His Pro Thr His		
	1265	1275
tat agc att cgc agc act ctt cgc atg gag ttg atg ggc tgt gat tta		3888
Tyr Ser Ile Arg Ser Thr Leu Arg Met Glu Leu Met Gly Cys Asp Leu		
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Asn Ser Cys Ser Met Pro Leu Gly Met Glu Ser Lys Ala Ile Ser Asp		
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gca cag att act gct tca tcc tac ttt acc aat atg ttt gcc acc tgg		3984
Ala Gln Ile Thr Ala Ser Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp		
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tct cct tca aaa gct cga ctt cac ctc caa ggg agg agt aat gcc tgg		4032
Ser Pro Ser Lys Ala Arg Leu His Leu Gln Gly Arg Ser Asn Ala Trp		
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aga cct cag gtg aat aat cca aaa gag tgg ctg caa gtg gac ttc cag		4080
Arg Pro Gln Val Asn Asn Pro Lys Glu Trp Leu Gln Val Asp Phe Gln		
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Lys Thr Met Lys Val Thr Gly Val Thr Thr Gln Gly Val Lys Ser Leu		
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ctt acc agc atg tat gtg aag gag ttc ctc atc tcc agc agt caa gat		4176
Leu Thr Ser Met Tyr Val Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp		
	1380	1390
ggc cat cag tgg act ctc ttt ttt cag aat ggc aaa gta aag gtt ttt		4224
Gly His Gln Trp Thr Leu Phe Phe Gln Asn Gly Lys Val Lys Val Phe		
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Pro Leu Leu Thr Arg Tyr Leu Arg Ile His Pro Gln Ser Trp Val His	
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Tyr	

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<400> 13

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Trp	Asp	Tyr	Met	Gln	Ser	Asp	Leu	Gly	Glu	Leu	Pro	Val	Asp	Ala	Arg
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Phe	Pro	Pro	Arg	Val	Pro	Lys	Ser	Phe	Pro	Phe	Asn	Thr	Ser	Val	Val
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Ala	Glu	Val	Tyr	Asp	Thr	Val	Val	Ile	Thr	Leu	Lys	Asn	Met	Ala	Ser
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Lys	Glu	Asn	Gly	Pro	Met	Ala	Ser	Asp	Pro	Leu	Cys	Leu	Thr	Tyr	Ser
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 Pro Ser Phe Ile Gln Ile Arg Ser Val Ala Lys Lys His Pro Lys Thr
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 His Gly Ile Thr Asp Val Arg Pro Leu Tyr Ser Arg Arg Leu Pro Lys
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 Gly Val Lys His Leu Lys Asp Phe Pro Ile Leu Pro Gly Glu Ile Phe
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 Pro Arg Cys Leu Thr Arg Tyr Tyr Ser Ser Phe Val Asn Met Glu Arg
 545 550 555 560
 Asp Leu Ala Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Tyr Lys Glu
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 Ser Val Asp Gln Arg Gly Asn Gln Ile Met Ser Asp Lys Arg Asn Val
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 Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val
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 Tyr Ile Leu Ser Ile Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe
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 Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr
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 Tyr Tyr Glu Asp Ser Tyr Glu Asp Ile Ser Ala Tyr Leu Leu Ser Lys
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 Glu Glu Ile Asp Tyr Asp Thr Ile Ser Val Glu Met Lys Lys Glu
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 Asp Phe Asp Ile Tyr Asp Glu Asp Glu Asn Gln Ser Pro Arg Ser Phe
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 Gln Lys Lys Thr Arg His Tyr Phe Ile Ala Ala Val Glu Arg Leu Trp

SEQUENCE LISTING 13097-3

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Lys	Asn	Phe	Val	Lys	Pro	Asn	Glu	Thr	Lys	Thr	Tyr	Phe	Trp	Lys	Val		
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Gln	His	His	Met	Ala	Pro	Thr	Lys	Asp	Glu	Phe	Asp	Cys	Lys	Ala	Trp		
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Ala	Tyr	Phe	Ser	Asp	Val	Asp	Leu	Glu	Lys	Asp	Val	His	Ser	Gly	Leu		
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Gly	Arg	Gln	Val	Thr	Val	Gln	Glu	Phe	Ala	Leu	Phe	Phe	Thr	Ile	Phe		
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Arg Pro Gln Val Asn Asn Pro Lys Glu Trp Leu Gln Val Asp Phe Gln
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Lys Thr Met Lys Val Thr Gly Val Thr Thr Gln Gly Val Lys Ser Leu
1365 1370 1375
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1380 1385 1390
Gly His Gln Trp Thr Leu Phe Phe Gln Asn Gly Lys Val Lys Val Phe
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ggc ttt agt gcc atc agg aga tac tac ctg ggc gca gtg gaa ctg tcc 96
Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
20 25 30
tgg gac tac cgg caa agt gaa ctc ctc cgt gag ctg cac gtg gac acc 144
Trp Asp Tyr Arg Gln Ser Glu Leu Leu Arg Glu Leu His Val Asp Thr
35 40 45
aga ttt cct gct aca gcg cca gga gct ctt ccg ttg ggc ccg tca gtc 192
Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
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Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser
65 70 75 80
gtt gcc agg ccc agg cca cca tgg atg ggt ctg ctg ggt cct acc atc 288
Val Ala Arg Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile
85 90 95
cag gct gag gtt tac gac acg gtg gtc gtt acc ctg aag aac atg gct 336
Gln Ala Glu Val Tyr Asp Thr Val Val Thr Leu Lys Asn Met Ala
100 105 110
tct cat ccc gtt agt ctt cac gct gtc ggc gtc tcc ttc tgg aaa tct 384
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Ser	Glu	Gly	Ala	Glu	Tyr	Glu	Asp	His	Thr	Ser	Gln	Arg	Glu	Lys	Glu		
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Ile	Gly	Ala	Leu	Leu	Val	Cys	Arg	Glu	Gly	Ser	Leu	Thr	Arg	Glu	Arg		
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acc	cag	aac	ctg	cac	gaa	ttt	gta	cta	ctt	ttt	gct	gtc	ttt	gat	gaa	672	
Thr	Gln	Asn	Leu	His	Glu	Phe	Val	Leu	Leu	Phe	Ala	Val	Phe	Asp	Glu		
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Gly	Lys	Ser	Trp	His	Ser	Ala	Arg	Asn	Asp	Ser	Trp	Thr	Arg	Ala	Met		
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gat	ccc	gca	cct	gcc	agg	gcc	cag	cct	gca	atg	cac	aca	gtc	aat	ggc	768	
Asp	Pro	Ala	Pro	Ala	Arg	Ala	Gln	Pro	Ala	Met	His	Thr	Val	Asn	Gly		
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Tyr	Val	Asn	Arg	Ser	Leu	Pro	Gly	Leu	Ile	Gly	Cys	His	Lys	Lys	Ser		
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His	Gly	Gly	Met	Glu	Ala	His	Val	Arg	Val	Glu	Ser	Cys	Ala	Glu	Glu		
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ccc	cag	ctg	cgg	agg	aaa	gct	gat	gaa	gag	gaa	gat	tat	gat	gac	aat	1104	
Pro	Gln	Leu	Arg	Arg	Lys	Ala	Asp	Glu	Glu	Glu	Asp	Tyr	Asp	Asp	Asn		
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SEQUENCE LISTING 13097-3

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385 390 395 400	
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405 410 415	
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435 440 445	
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465 470 475 480	
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485 490 495	
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530 535 540	
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545 550 555 560	
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565 570 575	
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610 615 620	

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cca gag ttc caa gct tct aac atc atg cac agc atc aat ggc tat gtt Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val 625 630 635 640	1920
ttt gat agc ttg cag ctg tct gtt tgt ttg cac gag gtg gca tac tgg Phe Asp Ser Leu Gln Leu Ser Val Cys Leu His Glu Val Ala Tyr Trp 645 650 655	1968
tac att cta agt gtt gga gca cag acg gac ttc ctc tcc gtc ttc ttc Tyr Ile Leu Ser Val Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe 660 665 670	2016
tct ggc tac acc ttc aaa cac aaa atg gtc tat gaa gac aca ctc acc Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr 675 680 685	2064
ctg ttc ccc ttc tca gga gaa acg gtc ttc atg tca atg gaa aac cca Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro 690 695 700	2112
ggt ctc tgg gtc ctt ggg tgc cac aac tca gac ttg cgg aac aga ggg Gly Leu Trp Val Leu Gly Cys His Asn Ser Asp Leu Arg Asn Arg Gly 705 710 715 720	2160
atg aca gcc tta ctg aag gtg tat agt tgt gac agg gac att ggt gat Met Thr Ala Leu Leu Lys Val Tyr Ser Cys Asp Arg Asp Ile Gly Asp 725 730 735	2208
tat tat gac aac act tat gaa gat att cca ggc ttc ttg ctg agt gga Tyr Tyr Asp Asn Thr Tyr Glu Asp Ile Pro Gly Phe Leu Leu Ser Gly 740 745 750	2256
aag aat gtc att gaa cct agg agc ttt gcc cag aat tca aga ccc cct Lys Asn Val Ile Glu Pro Arg Ser Phe Ala Gln Asn Ser Arg Pro Pro 755 760 765	2304
agt gcg agc gct cca aag cct ccg gtc ctg cga cgg cat cag agg gac Ser Ala Ser Ala Pro Lys Pro Pro Val Leu Arg Arg His Gln Arg Asp 770 775 780	2352
ata agc ctt cct act ttt cag ccg gag gaa gac aaa atg gac tat gat Ile Ser Leu Pro Thr Phe Gln Pro Glu Glu Asp Lys Met Asp Tyr Asp 785 790 795 800	2400
gat atc ttc tca act gaa acg aag gga gaa gat ttt gac att tac ggt Asp Ile Phe Ser Thr Glu Thr Lys Gly Glu Asp Phe Asp Ile Tyr Gly 805 810 815	2448
gag gat gaa aat cag gac cct cgc agc ttt cag aag aga acc cga cac Glu Asp Glu Asn Gln Asp Pro Arg Ser Phe Gln Lys Arg Thr Arg His 820 825 830	2496
tat ttc att gct gcg gtg gag cag ctc tgg gat tac ggg atg agc gaa Tyr Phe Ile Ala Ala Val Glu Gln Leu Trp Asp Tyr Gly Met Ser Glu 835 840 845	2544
tcc ccc cgg gcg cta aga aac agg gct cag aac gga gag gtg cct cgg Ser Pro Arg Ala Leu Arg Asn Arg Ala Gln Asn Gly Glu Val Pro Arg 850 855 860	2592
ttc aag aag gtg gtc ttc cgg gaa ttt gct gac ggc tcc ttc acg cag Phe Lys Lys Val Val Phe Arg Glu Phe Ala Asp Gly Ser Phe Thr Gln 865 870 875	2640

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865		870		875		880										
ccg	tcg	tac	cg	ggg	gaa	ctc	aac	aaa	cac	ttg	ggg	ctc	ttg	gga	ccc	2688
Pro	Ser	Tyr	Arg	Gly	Glu	Leu	Asn	Lys	His	Leu	Gly	Leu	Leu	Gly	Pro	
				885					890					895		
tac	atc	aga	gcg	gaa	gtt	gaa	gac	aac	atc	atg	gta	act	ttc	aaa	aac	2736
Tyr	Ile	Arg	Ala	Glu	Val	Glu	Asp	Asn	Ile	Met	Val	Thr	Phe	Lys	Asn	
			900					905					910			
cag	gcg	tct	cgt	ccc	tat	tcc	ttc	tac	tcg	agc	ctt	att	tct	tat	ccg	2784
Gln	Ala	Ser	Arg	Pro	Tyr	Ser	Phe	Tyr	Ser	Ser	Leu	Ile	Ser	Tyr	Pro	
		915					920					925				
gat	gat	cag	gag	caa	ggg	gca	gaa	cct	cga	cac	aac	ttc	gtc	cag	cca	2832
Asp	Asp	Gln	Glu	Gln	Gly	Ala	Glu	Pro	Arg	His	Asn	Phe	Val	Gln	Pro	
		930				935					940					
aat	gaa	acc	aga	act	tac	ttt	tgg	aaa	gtg	cag	cat	cac	atg	gca	ccc	2880
Asn	Glu	Thr	Arg	Thr	Tyr	Phe	Trp	Lys	Val	Gln	His	His	Met	Ala	Pro	
					950					955					960	
aca	gaa	gac	gag	ttt	gac	tgc	aaa	gcc	tgg	gcc	tac	ttt	tct	gat	gtt	2928
Thr	Glu	Asp	Glu	Phe	Asp	Cys	Lys	Ala	Trp	Ala	Tyr	Phe	Ser	Asp	Val	
				965					970					975		
gac	ctg	gaa	aaa	gat	gtg	cac	tca	ggc	ttg	atc	ggc	ccc	ctt	ctg	atc	2976
Asp	Leu	Glu	Lys	Asp	Val	His	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile	
			980					985					990			
tgc	cg	gcc	aac	acc	ctg	aac	gct	gct	cac	ggc	aga	caa	gtg	acc	gtg	3024
Cys	Arg	Ala	Asn	Thr	Leu	Asn	Ala	Ala	His	Gly	Arg	Gln	Val	Thr	Val	
			995				1000					1005				
caa	gaa	ttt	gct	ctg	ttt	ttc	act	att	ttt	gat	gag	aca	aag	agc	tgg	3072
Gln	Glu	Phe	Ala	Leu	Phe	Phe	Thr	Ile	Phe	Asp	Glu	Thr	Lys	Ser	Trp	
		1010				1015					1020					
tac	ttc	act	gaa	aat	gtg	gaa	agg	aac	tgc	cgg	gcc	ccc	tgc	cat	ctg	3120
Tyr	Phe	Thr	Glu	Asn	Val	Glu	Arg	Asn	Cys	Arg	Ala	Pro	Cys	His	Leu	
					1030				1035						1040	
cag	atg	gag	gac	ccc	act	ctg	aaa	gaa	aac	tat	cg	ttc	cat	gca	atc	3168
Gln	Met	Glu	Asp	Pro	Thr	Leu	Lys	Glu	Asn	Tyr	Arg	Phe	His	Ala	Ile	
				1045					1050					1055		
aat	ggc	tat	gtg	atg	gat	aca	ctc	cct	ggc	tta	gta	atg	gct	cag	aat	3216
Asn	Gly	Tyr	Val	Met	Asp	Thr	Leu	Pro	Gly	Leu	Val	Met	Ala	Gln	Asn	
			1060					1065					1070			
caa	agg	atc	cga	tgg	tat	ctg	ctc	agc	atg	ggc	agc	aat	gaa	aat	atc	3264
Gln	Arg	Ile	Arg	Trp	Tyr	Leu	Leu	Ser	Met	Gly	Ser	Asn	Glu	Asn	Ile	
			1075				1080					1085				
cat	tcg	att	cat	ttt	agc	gga	cac	gtg	ttc	agt	gta	cgg	aaa	aag	gag	3312
His	Ser	Ile	His	Phe	Ser	Gly	His	Val	Phe	Ser	Val	Arg	Lys	Lys	Glu	
			1090			1095					1100					
gag	tat	aaa	atg	gcc	gtg	tac	aat	ctc	tat	ccg	ggc	gtc	ttt	gag	aca	3360
Glu	Tyr	Lys	Met	Ala	Val	Tyr	Asn	Leu	Tyr	Pro	Gly	Val	Phe	Glu	Thr	
					1110					1115					1120	
gtg	gaa	atg	cta	ccg	tcc	aaa	gtt	gga	att	tgg	cga	ata	gaa	tgc	ctg	3408

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Val Glu Met Leu Pro Ser Lys Val Gly Ile Trp Arg Ile Glu Cys Leu	
1125 1130 1135	
att ggc gag cac ctg caa gct ggg atg agc acg act ttc ctg gtg tac	3456
Ile Gly Glu His Leu Gln Ala Gly Met Ser Thr Thr Phe Leu Val Tyr	
1140 1145 1150	
agc aag aag tgt cag act ccc ctg gga atg gct tct gga cac att aga	3504
Ser Lys Lys Cys Gln Thr Pro Leu Gly Met Ala Ser Gly His Ile Arg	
1155 1160 1165	
gat ttt cag att aca gct tca gga caa tat gga cag tgg gcc cca aag	3552
Asp Phe Gln Ile Thr Ala Ser Gly Gln Tyr Gly Gln Trp Ala Pro Lys	
1170 1175 1180	
ctg gcc aga ctt cat tat tcc gga tca atc aat gcc tgg agc acc aag	3600
Leu Ala Arg Leu His Tyr Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys	
1185 1190 1195 1200	
gag ccc ttt tct tgg atc aag gtg gat ctg ttg gca cca atg att att	3648
Glu Pro Phe Ser Trp Ile Lys Val Asp Leu Leu Ala Pro Met Ile Ile	
1205 1210 1215	
cac ggc atc aag acc cag ggt gcc cgt cag aag ttc tcc agc ctc tac	3696
His Gly Ile Lys Thr Gln Gly Ala Arg Gln Lys Phe Ser Ser Leu Tyr	
1220 1225 1230	
atc tct cag ttt atc atc atg tat agt ctt gat ggg aag aag tgg cag	3744
Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu Asp Gly Lys Lys Trp Gln	
1235 1240 1245	
act tat cga gga aat tcc act gga acc tta atg gtc ttc ttt ggc aat	3792
Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu Met Val Phe Phe Gly Asn	
1250 1255 1260	
gtg gat tca tct ggg ata aaa cac aat att ttt aac cct cca att att	3840
Val Asp Ser Ser Gly Ile Lys His Asn Ile Phe Asn Pro Pro Ile Ile	
1265 1270 1275 1280	
gct cga tac atc cgt ttg cac cca act cat tat agc att cgc agc act	3888
Ala Arg Tyr Ile Arg Leu His Pro Thr His Tyr Ser Ile Arg Ser Thr	
1285 1290 1295	
ctt cgc atg gag ttg atg ggc tgt gat tta aat agt tgc agc atg cca	3936
Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser Cys Ser Met Pro	
1300 1305 1310	
ttg gga atg gag agt aaa gca ata tca gat gca cag att act gct tca	3984
Leu Gly Met Glu Ser Lys Ala Ile Ser Asp Ala Gln Ile Thr Ala Ser	
1315 1320 1325	
tcc tac ttt acc aat atg ttt gcc acc tgg tct cct tca aaa gct cga	4032
Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp Ser Pro Ser Lys Ala Arg	
1330 1335 1340	
ctt cac ctc caa ggg agg agt aat gcc tgg aga cct cag gtg aat aat	4080
Leu His Leu Gln Gly Arg Ser Asn Ala Trp Arg Pro Gln Val Asn Asn	
1345 1350 1355 1360	
cca aaa gag tgg ctg caa gtg gac ttc cag aag aca atg aaa gtc aca	4128
Pro Lys Glu Trp Leu Gln Val Asp Phe Gln Lys Thr Met Lys Val Thr	
1365 1370 1375	

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gga gta act act cag gga gta aaa tct ctg ctt acc agc atg tat gtg 4176
 Gly Val Thr Thr Gln Gly Val Lys Ser Leu Leu Thr Ser Met Tyr Val
 1380 1385 1390

aag gag ttc ctc atc tcc agc agt caa gat ggc cat cag tgg act ctc 4224
 Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp Gly His Gln Trp Thr Leu
 1395 1400 1405

ttt ttt cag aat ggc aaa gta aag gtt ttt cag gga aat caa gac tcc 4272
 Phe Phe Gln Asn Gly Lys Val Lys Val Phe Gln Gly Asn Gln Asp Ser
 1410 1415 1420

ttc aca cct gtg gtg aac tct cta gac cca ccg tta ctg act cgc tac 4320
 Phe Thr Pro Val Val Asn Ser Leu Asp Pro Pro Leu Leu Thr Arg Tyr
 1425 1430 1435 1440

ctt cga att cac ccc cag agt tgg gtg cac cag att gcc ctg agg atg 4368
 Leu Arg Ile His Pro Gln Ser Trp Val His Gln Ile Ala Leu Arg Met
 1445 1450 1455

gag gtt ctg ggc tgc gag gca cag gac ctc tac 4401
 Glu Val Leu Gly Cys Glu Ala Gln Asp Leu Tyr
 1460 1465

<210> 15

<211> 1467

<212> PRT

<213> Artificial Sequence

<220>

<223> HP44/OL-- factor VIII having the following
 domains: A1p-A2p-app-A3p-C1h-C2h

<400> 15

Met Gln Leu Glu Leu Ser Thr Cys Val Phe Leu Cys Leu Leu Pro Leu
 1 5 10 15
 Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
 20 25 30
 Trp Asp Tyr Arg Gln Ser Glu Leu Leu Arg Glu Leu His Val Asp Thr
 35 40 45
 Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
 50 55 60
 Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser
 65 70 75 80
 Val Ala Arg Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile
 85 90 95
 Gln Ala Glu Val Tyr Asp Thr Val Val Thr Leu Lys Asn Met Ala
 100 105 110
 Ser His Pro Val Ser Leu His Ala Val Gly Val Ser Phe Trp Lys Ser
 115 120 125
 Ser Glu Gly Ala Glu Tyr Glu Asp His Thr Ser Gln Arg Glu Lys Glu
 130 135 140
 Asp Asp Lys Val Leu Pro Gly Lys Ser Gln Thr Tyr Val Trp Gln Val
 145 150 155 160
 Leu Lys Glu Asn Gly Pro Thr Ala Ser Asp Pro Pro Cys Leu Thr Tyr
 165 170 175
 Ser Tyr Leu Ser His Val Asp Leu Val Lys Asp Leu Asn Ser Gly Leu
 180 185 190
 Ile Gly Ala Leu Leu Val Cys Arg Glu Gly Ser Leu Thr Arg Glu Arg
 195 200 205
 Thr Gln Asn Leu His Glu Phe Val Leu Leu Phe Ala Val Phe Asp Glu
 210 215 220

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Gly 225	Lys	Ser	Trp	His	Ser 230	Ala	Arg	Asn	Asp	Ser 235	Trp	Thr	Arg	Ala	Met 240
Asp	Pro	Ala	Pro	Ala 245	Arg	Ala	Gln	Pro	Ala 250	Met	His	Thr	Val	Asn 255	Gly
Tyr	Val	Asn	Arg 260	Ser	Leu	Pro	Gly	Leu 265	Ile	Gly	Cys	His	Lys 270	Lys	Ser
Val	Tyr	Trp 275	His	Val	Ile	Gly	Met 280	Gly	Thr	Ser	Pro	Glu	Val	His	Ser
Ile	Phe 290	Leu	Glu	Gly	His	Thr 295	Phe	Leu	Val	Arg	His 300	His	Arg	Gln	Ala
Ser 305	Leu	Glu	Ile	Ser	Pro 310	Leu	Thr	Phe	Leu	Thr 315	Ala	Gln	Thr	Phe	Leu 320
Met	Asp	Leu	Gly	Gln 325	Phe	Leu	Leu	Phe	Cys 330	His	Ile	Ser	Ser	His 335	His
His	Gly	Gly	Met 340	Glu	Ala	His	Val	Arg 345	Val	Glu	Ser	Cys	Ala 350	Glu	Glu
Pro	Gln	Leu 355	Arg	Arg	Lys	Ala	Asp 360	Glu	Glu	Glu	Asp	Tyr 365	Asp	Asp	Asn
Leu	Tyr 370	Asp	Ser	Asp	Met	Asp 375	Val	Val	Arg	Leu	Asp 380	Gly	Asp	Asp	Val
Ser 385	Pro	Phe	Ile	Gln	Ile 390	Arg	Ser	Val	Ala	Lys 395	Lys	His	Pro	Lys	Thr 400
Trp	Val	His	Tyr	Ile 405	Ser	Ala	Glu	Glu	Glu 410	Asp	Trp	Asp	Tyr	Ala 415	Pro
Ala	Val	Pro	Ser 420	Pro	Ser	Asp	Arg	Ser 425	Tyr	Lys	Ser	Leu	Tyr 430	Leu	Asn
Ser	Gly	Pro 435	Gln	Arg	Ile	Gly	Arg 440	Lys	Tyr	Lys	Lys	Ala 445	Arg	Phe	Val
Ala	Tyr 450	Thr	Asp	Val	Thr	Phe 455	Lys	Thr	Arg	Lys	Ala 460	Ile	Pro	Tyr	Glu
Ser 465	Gly	Ile	Leu	Gly	Pro 470	Leu	Leu	Tyr	Gly	Glu 475	Val	Gly	Asp	Thr	Leu 480
Leu	Ile	Ile	Phe	Lys 485	Asn	Lys	Ala	Ser	Arg 490	Pro	Tyr	Asn	Ile	Tyr 495	Pro
His	Gly	Ile	Thr 500	Asp	Val	Ser	Ala	Leu 505	His	Pro	Gly	Arg	Leu 510	Leu	Lys
Gly	Trp	Lys 515	His	Leu	Lys	Asp	Met 520	Pro	Ile	Leu	Pro	Gly 525	Glu	Thr	Phe
Lys	Tyr 530	Lys	Trp	Thr	Val	Thr 535	Val	Glu	Asp	Gly	Pro 540	Thr	Lys	Ser	Asp
Pro 545	Arg	Cys	Leu	Thr	Arg 550	Tyr	Tyr	Ser	Ser	Ser 555	Ile	Asn	Leu	Glu	Lys 560
Asp	Leu	Ala	Ser	Gly 565	Leu	Ile	Gly	Pro	Leu 570	Leu	Ile	Cys	Tyr	Lys 575	Glu
Ser	Val	Asp	Gln 580	Arg	Gly	Asn	Gln	Met 585	Met	Ser	Asp	Lys	Arg 590	Asn	Val
Ile	Leu	Phe 595	Ser	Val	Phe	Asp	Glu 600	Asn	Gln	Ser	Trp	Tyr 605	Leu	Ala	Glu
Asn	Ile 610	Gln	Arg	Phe	Leu	Pro 615	Asn	Pro	Asp	Gly	Leu 620	Gln	Pro	Gln	Asp
Pro 625	Glu	Phe	Gln	Ala	Ser 630	Asn	Ile	Met	His	Ser 635	Ile	Asn	Gly	Tyr	Val 640
Phe	Asp	Ser	Leu	Gln 645	Leu	Ser	Val	Cys	Leu 650	His	Glu	Val	Ala	Tyr 655	Trp
Tyr	Ile	Leu	Ser 660	Val	Gly	Ala	Gln	Thr 665	Asp	Phe	Leu	Ser	Val 670	Phe	Phe
Ser	Gly	Tyr 675	Thr	Phe	Lys	His	Lys 680	Met	Val	Tyr	Glu	Asp 685	Thr	Leu	Thr
Leu	Phe 690	Pro	Phe	Ser	Gly	Glu 695	Thr	Val	Phe	Met	Ser 700	Met	Glu	Asn	Pro
Gly 705	Leu	Trp	Val	Leu	Gly 710	Cys	His	Asn	Ser	Asp 715	Leu	Arg	Asn	Arg	Gly 720
Met	Thr	Ala	Leu	Leu	Lys	Val	Tyr	Ser	Cys	Asp	Arg	Asp	Ile	Gly	Asp

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Tyr	Tyr	Asp	Asn	Thr	Tyr	Glu	Asp	Ile	Pro	Gly	Phe	Leu	Leu	Ser	Gly
			740					745					750		
Lys	Asn	Val	Ile	Glu	Pro	Arg	Ser	Phe	Ala	Gln	Asn	Ser	Arg	Pro	Pro
			755				760					765			
Ser	Ala	Ser	Ala	Pro	Lys	Pro	Pro	Val	Leu	Arg	Arg	His	Gln	Arg	Asp
			770				775								
Ile	Ser	Leu	Pro	Thr	Phe	Gln	Pro	Glu	Glu	Asp	Lys	Met	Asp	Tyr	Asp
					790					795					800
Asp	Ile	Phe	Ser	Thr	Glu	Thr	Lys	Gly	Glu	Asp	Phe	Asp	Ile	Tyr	Gly
				805					810					815	
Glu	Asp	Glu	Asn	Gln	Asp	Pro	Arg	Ser	Phe	Gln	Lys	Arg	Thr	Arg	His
			820					825					830		
Tyr	Phe	Ile	Ala	Ala	Val	Glu	Gln	Leu	Trp	Asp	Tyr	Gly	Met	Ser	Glu
			835				840					845			
Ser	Pro	Arg	Ala	Leu	Arg	Asn	Arg	Ala	Gln	Asn	Gly	Glu	Val	Pro	Arg
						855						860			
Phe	Lys	Lys	Val	Val	Phe	Arg	Glu	Phe	Ala	Asp	Gly	Ser	Phe	Thr	Gln
					870					875					880
Pro	Ser	Tyr	Arg	Gly	Glu	Leu	Asn	Lys	His	Leu	Gly	Leu	Leu	Gly	Pro
				885					890					895	
Tyr	Ile	Arg	Ala	Glu	Val	Glu	Asp	Asn	Ile	Met	Val	Thr	Phe	Lys	Asn
			900					905					910		
Gln	Ala	Ser	Arg	Pro	Tyr	Ser	Phe	Tyr	Ser	Ser	Leu	Ile	Ser	Tyr	Pro
			915				920					925			
Asp	Asp	Gln	Glu	Gln	Gly	Ala	Glu	Pro	Arg	His	Asn	Phe	Val	Gln	Pro
						935					940				
Asn	Glu	Thr	Arg	Thr	Tyr	Phe	Trp	Lys	Val	Gln	His	His	Met	Ala	Pro
					950					955					960
Thr	Glu	Asp	Glu	Phe	Asp	Cys	Lys	Ala	Trp	Ala	Tyr	Phe	Ser	Asp	Val
				965					970					975	
Asp	Leu	Glu	Lys	Asp	Val	His	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile
			980					985					990		
Cys	Arg	Ala	Asn	Thr	Leu	Asn	Ala	Ala	His	Gly	Arg	Gln	Val	Thr	Val
			995				1000					1005			
Gln	Glu	Phe	Ala	Leu	Phe	Phe	Thr	Ile	Phe	Asp	Glu	Thr	Lys	Ser	Trp
					1015					1020					
Tyr	Phe	Thr	Glu	Asn	Val	Glu	Arg	Asn	Cys	Arg	Ala	Pro	Cys	His	Leu
					1030					1035					1040
Gln	Met	Glu	Asp	Pro	Thr	Leu	Lys	Glu	Asn	Tyr	Arg	Phe	His	Ala	Ile
				1045					1050					1055	
Asn	Gly	Tyr	Val	Met	Asp	Thr	Leu	Pro	Gly	Leu	Val	Met	Ala	Gln	Asn
			1060					1065					1070		
Gln	Arg	Ile	Arg	Trp	Tyr	Leu	Leu	Ser	Met	Gly	Ser	Asn	Glu	Asn	Ile
			1075				1080								

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Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu Asp Gly Lys Lys Trp Gln
1235 1240 1245
Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu Met Val Phe Phe Gly Asn
1250 1255 1260
Val Asp Ser Ser Gly Ile Lys His Asn Ile Phe Asn Pro Pro Ile Ile
1265 1270 1275 1280
Ala Arg Tyr Ile Arg Leu His Pro Thr His Tyr Ser Ile Arg Ser Thr
1285 1290 1295
Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser Cys Ser Met Pro
1300 1305 1310
Leu Gly Met Glu Ser Lys Ala Ile Ser Asp Ala Gln Ile Thr Ala Ser
1315 1320 1325
Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp Ser Pro Ser Lys Ala Arg
1330 1335 1340
Leu His Leu Gln Gly Arg Ser Asn Ala Trp Arg Pro Gln Val Asn Asn
1345 1350 1355 1360
Pro Lys Glu Trp Leu Gln Val Asp Phe Gln Lys Thr Met Lys Val Thr
1365 1370 1375
Gly Val Thr Thr Gln Gly Val Lys Ser Leu Leu Thr Ser Met Tyr Val
1380 1385 1390
Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp Gly His Gln Trp Thr Leu
1395 1400 1405
Phe Phe Gln Asn Gly Lys Val Lys Val Phe Gln Gly Asn Gln Asp Ser
1410 1415 1420
Phe Thr Pro Val Val Asn Ser Leu Asp Pro Pro Leu Leu Thr Arg Tyr
1425 1430 1435 1440
Leu Arg Ile His Pro Gln Ser Trp Val His Gln Ile Ala Leu Arg Met
1445 1450 1455
Glu Val Leu Gly Cys Glu Ala Gln Asp Leu Tyr
1460 1465

<210> 16
<211> 4371
<212> DNA
<213> Artificial Sequence

<220>
<223> hybrid human and porcine factor VIII sequence

<221> CDS
<222> (1)...(4371)
<223> HP46/SQ-- factor VIII having the following
domains: A1p-A2h-aph-A3h-C1h-C2h

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Met Gln Leu Glu Leu Ser Thr Cys Val Phe Leu Cys Leu Leu Pro Leu
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ggc ttt agt gcc atc agg aga tac tac ctg ggc gca gtg gaa ctg tcc 96
Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
20 25 30
tgg gac tac cgg caa agt gaa ctc ctc cgt gag ctg cac gtg gac acc 144
Trp Asp Tyr Arg Gln Ser Glu Leu Leu Arg Glu Leu His Val Asp Thr
35 40 45
aga ttt cct gct aca gcg cca gga gct ctt ccg ttg ggc ccg tca gtc 192
Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
50 55 60
ctg tac aaa aag act gtg ttc gta gag ttc acg gat caa ctt ttc agc 240

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Leu 65	Tyr	Lys	Lys	Thr	Val 70	Phe	Val	Glu	Phe	Thr 75	Asp	Gln	Leu	Phe	Ser 80	
gtt Val	gcc Ala	agg Arg	ccc Pro	agg Arg 85	cca Pro	cca Pro	tgg Trp	atg Met	ggg Gly 90	ctg Leu	ctg Leu	ggg Gly	cct Pro	acc Thr 95	atc Ile	288
cag Gln	gct Ala	gag Glu	gtt Val 100	tac Tyr	gac Asp	acg Thr	gtg Val	gtc Val 105	gtt Val	acc Thr	ctg Leu	aag Lys	aac Asn 110	atg Met	gct Ala	336
tct Ser	cat His	ccc Pro 115	gtt Val	agt Ser	ctt Leu	cac His	gct Ala 120	gtc Val	ggc Gly	gtc Val	tcc Ser	ttc Phe 125	tgg Trp	aaa Lys	tct Ser	384
tcc Ser	gaa Glu 130	ggc Gly	gct Ala	gaa Glu	tat Tyr	gag Glu 135	gat Asp	cac His	acc Thr	agc Ser	caa Gln 140	agg Arg	gag Glu	aag Lys	gaa Glu	432
gac Asp 145	gat Asp	aaa Lys	gtc Val	ctt Leu	ccc Pro 150	ggg Gly	aaa Lys	agc Ser	caa Gln	acc Thr 155	tac Tyr	gtc Val	tgg Trp	cag Gln	gtc Val 160	480
ctg Leu	aaa Lys	gaa Glu	aat Asn 165	ggg Gly	cca Pro	aca Thr	gcc Ala	tct Ser	gac Asp 170	cca Pro	cca Pro	tgt Cys	ctt Leu	acc Thr 175	tac Tyr	528
tca Ser	tac Tyr	ctg Leu	tct Ser 180	cac His	gtg Val	gac Asp	ctg Leu	gtg Val 185	aaa Lys	gac Asp	ctg Leu	aat Asn	tcg Ser 190	ggc Gly	ctc Leu	576
att Ile	gga Gly	gcc Ala 195	ctg Leu	ctg Leu	gtt Val	tgt Cys	aga Arg 200	gaa Glu	ggg Gly	agt Ser	ctg Leu	acc Thr 205	aga Arg	gaa Glu	agg Arg	624
acc Thr	cag Gln 210	aac Asn	ctg Leu	cac His	gaa Glu	ttt Phe 215	gta Val	cta Leu	ctt Leu	ttt Phe	gct Ala 220	gtc Val	ttt Phe	gat Asp	gaa Glu	672
ggg Gly 225	aaa Lys	agt Ser	tgg Trp	cac His	tca Ser 230	gca Ala	aga Arg	aat Asn	gac Asp	tcc Ser 235	tgg Trp	aca Thr	cgg Arg	gcc Ala	atg Met 240	720
gat Asp	ccc Pro	gca Ala	cct Pro	gcc Ala 245	agg Arg	gcc Ala	cag Gln	cct Pro	gca Ala 250	atg Met	cac His	aca Thr	gtc Val	aat Asn 255	ggc Gly	768
tat Tyr	gtc Val	aac Asn	agg Arg 260	tct Ser	ctg Leu	cca Pro	ggg Gly	ctg Leu 265	atc Ile	gga Gly	tgt Cys	cat His	aag Lys 270	aaa Lys	tca Ser	816
gtc Val	tac Tyr	tgg Trp 275	cac His	gtg Val	att Ile	gga Gly	atg Met 280	ggc Gly	acc Thr	agc Ser	ccg Pro	gaa Glu 285	gtg Val	cac His	tcc Ser	864
att Ile 290	ttt Phe	ctt Leu	gaa Glu	ggc Gly	cac His	acg Thr 295	ttt Phe	ctc Leu	gtg Val	agg Arg	cac His 300	cat His	cgc Arg	cag Gln	gct Ala	912
tcc Ser 305	ttg Leu	gag Glu	atc Ile	tcg Ser	cca Pro 310	cta Leu	act Thr	ttc Phe	ctc Leu	act Thr 315	gct Ala	cag Gln	aca Thr	ttc Phe	ctg Leu 320	960

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atg gac ctt ggc cag ttc cta ctg ttt tgt cat atc tct tcc cac cac	1008
Met Asp Leu Gly Gln Phe Leu Leu Phe Cys His Ile Ser Ser His His	
325 330 335	
cat ggt ggc atg gag gct cac gtc aga gta gaa agc tgc gcc gag gag	1056
His Gly Gly Met Glu Ala His Val Arg Val Glu Ser Cys Ala Glu Glu	
340 345 350	
ccc cag ctg cgg agg aaa gct gat gaa gag gaa gat tat gat gac aat	1104
Pro Gln Leu Arg Arg Lys Ala Asp Glu Glu Glu Asp Tyr Asp Asp Asn	
355 360 365	
ttg tac gac tcg gac atg gac gtg gtc cgg ctc gat ggt gac gac gtg	1152
Leu Tyr Asp Ser Asp Met Asp Val Val Arg Leu Asp Gly Asp Asp Val	
370 375 380	
tct ccc ttt atc caa atc cgc tca gtt gcc aag aag cat cct aaa act	1200
Ser Pro Phe Ile Gln Ile Arg Ser Val Ala Lys Lys His Pro Lys Thr	
385 390 395 400	
tgg gta cat tac att gct gct gaa gag gag gac tgg gac tat gct ccc	1248
Trp Val His Tyr Ile Ala Ala Glu Glu Glu Asp Trp Asp Tyr Ala Pro	
405 410 415	
tta gtc ctc gcc ccc gat gac aga agt tat aaa agt caa tat ttg aac	1296
Leu Val Leu Ala Pro Asp Asp Arg Ser Tyr Lys Ser Gln Tyr Leu Asn	
420 425 430	
aat ggc cct cag cgg att ggt agg aag tac aaa aaa gtc cga ttt atg	1344
Asn Gly Pro Gln Arg Ile Gly Arg Lys Tyr Lys Lys Val Arg Phe Met	
435 440 445	
gca tac aca gat gaa acc ttt aag acg cgt gaa gct att cag cat gaa	1392
Ala Tyr Thr Asp Glu Thr Phe Lys Thr Arg Glu Ala Ile Gln His Glu	
450 455 460	
tca gga atc ttg gga cct tta ctt tat ggg gaa gtt gga gac aca ctg	1440
Ser Gly Ile Leu Gly Pro Leu Leu Tyr Gly Glu Val Gly Asp Thr Leu	
465 470 475 480	
ttg att ata ttt aag aat caa gca agc aga cca tat aac atc tac cct	1488
Leu Ile Ile Phe Lys Asn Gln Ala Ser Arg Pro Tyr Asn Ile Tyr Pro	
485 490 495	
cac gga atc act gat gtc cgt cct ttg tat tca agg aga tta cca aaa	1536
His Gly Ile Thr Asp Val Arg Pro Leu Tyr Ser Arg Arg Leu Pro Lys	
500 505 510	
ggt gta aaa cat ttg aag gat ttt cca att ctg cca gga gaa ata ttc	1584
Gly Val Lys His Leu Lys Asp Phe Pro Ile Leu Pro Gly Glu Ile Phe	
515 520 525	
aaa tat aaa tgg aca gtg act gta gaa gat ggg cca act aaa tca gat	1632
Lys Tyr Lys Trp Thr Val Thr Val Glu Asp Gly Pro Thr Lys Ser Asp	
530 535 540	
ccg cgg tgc ctg acc cgc tat tac tct agt ttc gtt aat atg gag aga	1680
Pro Arg Cys Leu Thr Arg Tyr Tyr Ser Ser Phe Val Asn Met Glu Arg	
545 550 555 560	
gat cta gct tca gga ctc att ggc cct ctc ctc atc tgc tac aaa gaa	1728
Asp Leu Ala Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Tyr Lys Glu	
565 570 575	

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tct gta gat caa aga gga aac cag ata atg tca gac aag agg aat gtc Ser Val Asp Gln Arg Gly Asn Gln Ile Met Ser Asp Lys Arg Asn Val 580 585 590	1776
atc ctg ttt tct gta ttt gat gag aac cga agc tgg tac ctc aca gag Ile Leu Phe Ser Val Phe Asp Glu Asn Arg Ser Trp Tyr Leu Thr Glu 595 600 605	1824
aat ata caa cgc ttt ctc ccc aat cca gct gga gtg cag ctt gag gat Asn Ile Gln Arg Phe Leu Pro Asn Pro Ala Gly Val Gln Leu Glu Asp 610 615 620	1872
cca gag ttc caa gcc tcc aac atc atg cac agc atc aat ggc tat gtt Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val 625 630 635 640	1920
ttt gat agt ttg cag ttg tca gtt tgt ttg cat gag gtg gca tac tgg Phe Asp Ser Leu Gln Leu Ser Val Cys Leu His Glu Val Ala Tyr Trp 645 650 655	1968
tac att cta agc att gga gca cag act gac ttc ctt tct gtc ttc ttc Tyr Ile Leu Ser Ile Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe 660 665 670	2016
tct gga tat acc ttc aaa cac aaa atg gtc tat gaa gac aca ctc acc Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr 675 680 685	2064
cta ttc cca ttc tca gga gaa act gtc ttc atg tcg atg gaa aac cca Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro 690 695 700	2112
ggt cta tgg att ctg ggg tgc cac aac tca gac ttt cgg aac aga ggc Gly Leu Trp Ile Leu Gly Cys His Asn Ser Asp Phe Arg Asn Arg Gly 705 710 715 720	2160
atg acc gcc tta ctg aag gtt tct agt tgt gac aag aac act ggt gat Met Thr Ala Leu Leu Lys Val Ser Ser Cys Asp Lys Asn Thr Gly Asp 725 730 735	2208
tat tac gag gac agt tat gaa gat att tca gca tac ttg ctg agt aaa Tyr Tyr Glu Asp Ser Tyr Glu Asp Ile Ser Ala Tyr Leu Leu Ser Lys 740 745 750	2256
aac aat gcc att gaa cct agg agc ttc tct cag aat cca cca gtc ttg Asn Asn Ala Ile Glu Pro Arg Ser Phe Ser Gln Asn Pro Pro Val Leu 755 760 765	2304
aaa cgc cat caa cgg gaa ata act cgt act act ctt cag tca gat caa Lys Arg His Gln Arg Glu Ile Thr Arg Thr Thr Leu Gln Ser Asp Gln 770 775 780	2352
gag gaa att gac tat gat gat acc ata tca gtt gaa atg aag aag gaa Glu Glu Ile Asp Tyr Asp Asp Thr Ile Ser Val Glu Met Lys Lys Glu 785 790 795 800	2400
gat ttt gac att tat gat gag gat gaa aat cag agc ccc cgc agc ttt Asp Phe Asp Ile Tyr Asp Glu Asp Glu Asn Gln Ser Pro Arg Ser Phe 805 810 815	2448
caa aag aaa aca cga cac tat ttt att gct gca gtg gag agg ctc tgg Gln Lys Lys Thr Arg His Tyr Phe Ile Ala Ala Val Glu Arg Leu Trp 815 820 825	2496

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825 830

820	gat tat ggg atg agt agc tcc cca cat gtt cta aga aac agg gct cag Asp Tyr Gly Met Ser Ser Ser Pro His Val Leu Arg Asn Arg Ala Gln 835 840 845	2544
	agt ggc agt gtc cct cag ttc aag aaa gtt gtt ttc cag gaa ttt act Ser Gly Ser Val Pro Gln Phe Lys Lys Val Val Phe Gln Glu Phe Thr 850 855 860	2592
	gat ggc tcc ttt act cag ccc tta tac cgt gga gaa cta aat gaa cat Asp Gly Ser Phe Thr Gln Pro Leu Tyr Arg Gly Glu Leu Asn Glu His 865 870 875 880	2640
	ttg gga ctc ctg ggg cca tat ata aga gca gaa gtt gaa gat aat atc Leu Gly Leu Leu Gly Pro Tyr Ile Arg Ala Glu Val Glu Asp Asn Ile 885 890 895	2688
	atg gta act ttc aga aat cag gcc tct cgt ccc tat tcc ttc tat tct Met Val Thr Phe Arg Asn Gln Ala Ser Arg Pro Tyr Ser Phe Tyr Ser 900 905 910	2736
	agc ctt att tct tat gag gaa gat cag agg caa gga gca gaa cct aga Ser Leu Ile Ser Tyr Glu Glu Asp Gln Arg Gln Gly Ala Glu Pro Arg 915 920 925	2784
	aaa aac ttt gtc aag cct aat gaa acc aaa act tac ttt tgg aaa gtg Lys Asn Phe Val Lys Pro Asn Glu Thr Lys Thr Tyr Phe Trp Lys Val 930 935 940	2832
	caa cat cat atg gca ccc act aaa gat gag ttt gac tgc aaa gcc tgg Gln His His Met Ala Pro Thr Lys Asp Glu Phe Asp Cys Lys Ala Trp 945 950 955 960	2880
	gct tat ttc tct gat gtt gac ctg gaa aaa gat gtg cac tca ggc ctg Ala Tyr Phe Ser Asp Val Asp Leu Glu Lys Asp Val His Ser Gly Leu 965 970 975	2928
	att gga ccc ctt ctg gtc tgc cac act aac aca ctg aac cct gct cat Ile Gly Pro Leu Leu Val Cys His Thr Asn Thr Leu Asn Pro Ala His 980 985 990	2976
	ggg aga caa gtg aca gta cag gaa ttt gct ctg ttt ttc acc atc ttt Gly Arg Gln Val Thr Val Gln Glu Phe Ala Leu Phe Phe Thr Ile Phe 995 1000 1005	3024
	gat gag acc aaa agc tgg tac ttc act gaa aat atg gaa aga aac tgc Asp Glu Thr Lys Ser Trp Tyr Phe Thr Glu Asn Met Glu Arg Asn Cys 1010 1015 1020	3072
	agg gct ccc tgc aat atc cag atg gaa gat ccc act ttt aaa gag aat Arg Ala Pro Cys Asn Ile Gln Met Glu Asp Pro Thr Phe Lys Glu Asn 1025 1030 1035 1040	3120
	tat cgc ttc cat gca atc aat ggc tac ata atg gat aca cta cct ggc Tyr Arg Phe His Ala Ile Asn Gly Tyr Ile Met Asp Thr Leu Pro Gly 1045 1050 1055	3168
	tta gta atg gct cag gat caa agg att cga tgg tat ctg ctc agc atg Leu Val Met Ala Gln Asp Gln Arg Ile Arg Trp Tyr Leu Leu Ser Met 1060 1065 1070	3216
	ggc agc aat gaa aac atc cat tct att cat ttc agt gga cat gtg ttc	3264

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Gly Ser Asn Glu Asn Ile His	Ser Ile His Phe Ser Gly His Val Phe	
1075	1080	1085
act gta cga aaa aaa gag gag tat aaa atg gca ctg tac aat ctc tat	3312	
Thr Val Arg Lys Lys Glu Glu Tyr Lys Met Ala Leu Tyr Asn Leu Tyr		
1090	1095	1100
cca ggt gtt ttt gag aca gtg gaa atg tta cca tcc aaa gct gga att	3360	
Pro Gly Val Phe Glu Thr Val Glu Met Leu Pro Ser Lys Ala Gly Ile		
1105	1110	1115
tgg cgg gtg gaa tgc ctt att ggc gag cat cta cat gct ggg atg agc	3408	
Trp Arg Val Glu Cys Leu Ile Gly Glu His Leu His Ala Gly Met Ser		
1125	1130	1135
aca ctt ttt ctg gtg tac agc aat aag tgt cag act ccc ctg gga atg	3456	
Thr Leu Phe Leu Val Tyr Ser Asn Lys Cys Gln Thr Pro Leu Gly Met		
1140	1145	1150
gct tct gga cac att aga gat ttt cag att aca gct tca gga caa tat	3504	
Ala Ser Gly His Ile Arg Asp Phe Gln Ile Thr Ala Ser Gly Gln Tyr		
1155	1160	1165
gga cag tgg gcc cca aag ctg gcc aga ctt cat tat tcc gga tca atc	3552	
Gly Gln Trp Ala Pro Lys Leu Ala Arg Leu His Tyr Ser Gly Ser Ile		
1170	1175	1180
aat gcc tgg agc acc aag gag ccc ttt tct tgg atc aag gtg gat ctg	3600	
Asn Ala Trp Ser Thr Lys Glu Pro Phe Ser Trp Ile Lys Val Asp Leu		
1185	1190	1200
ttg gca cca atg att att cac ggc atc aag acc cag ggt gcc cgt cag	3648	
Leu Ala Pro Met Ile Ile His Gly Ile Lys Thr Gln Gly Ala Arg Gln		
1205	1210	1215
aag ttc tcc agc ctc tac atc tct cag ttt atc atc atg tat agt ctt	3696	
Lys Phe Ser Ser Leu Tyr Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu		
1220	1225	1230
gat ggg aag aag tgg cag act tat cga gga aat tcc act gga acc tta	3744	
Asp Gly Lys Lys Trp Gln Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu		
1235	1240	1245
atg gtc ttc ttt ggc aat gtg gat tca tct ggg ata aaa cac aat att	3792	
Met Val Phe Phe Gly Asn Val Asp Ser Ser Gly Ile Lys His Asn Ile		
1250	1255	1260
ttt aac cct cca att att gct cga tac atc cgt ttg cac cca act cat	3840	
Phe Asn Pro Pro Ile Ile Ala Arg Tyr Ile Arg Leu His Pro Thr His		
1265	1270	1275
tat agc att cgc agc act ctt cgc atg gag ttg atg ggc tgt gat tta	3888	
Tyr Ser Ile Arg Ser Thr Leu Arg Met Glu Leu Met Gly Cys Asp Leu		
1285	1290	1295
aat agt tgc agc atg cca ttg gga atg gag agt aaa gca ata tca gat	3936	
Asn Ser Cys Ser Met Pro Leu Gly Met Glu Ser Lys Ala Ile Ser Asp		
1300	1305	1310
gca cag att act gct tca tcc tac ttt acc aat atg ttt gcc acc tgg	3984	
Ala Gln Ile Thr Ala Ser Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp		
1315	1320	1325

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tct cct tca aaa gct cga ctt cac ctc caa ggg agg agt aat gcc tgg	4032
Ser Pro Ser Lys Ala Arg Leu His Leu Gln Gly Arg Ser Asn Ala Trp	
1330 1335 1340	
aga cct cag gtg aat aat cca aaa gag tgg ctg caa gtg gac ttc cag	4080
Arg Pro Gln Val Asn Asn Pro Lys Glu Trp Leu Gln Val Asp Phe Gln	
1345 1350 1355 1360	
aag aca atg aaa gtc aca gga gta act act cag gga gta aaa tct ctg	4128
Lys Thr Met Lys Val Thr Gly Val Thr Thr Gln Gly Val Lys Ser Leu	
1365 1370 1375	
ctt acc agc atg tat gtg aag gag ttc ctc atc tcc agc agt caa gat	4176
Leu Thr Ser Met Tyr Val Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp	
1380 1385 1390	
ggc cat cag tgg act ctc ttt ttt cag aat ggc aaa gta aag gtt ttt	4224
Gly His Gln Trp Thr Leu Phe Phe Gln Asn Gly Lys Val Lys Val Phe	
1395 1400 1405	
cag gga aat caa gac tcc ttc aca cct gtg gtg aac tct cta gac cca	4272
Gln Gly Asn Gln Asp Ser Phe Thr Pro Val Val Asn Ser Leu Asp Pro	
1410 1415 1420	
ccg tta ctg act cgc tac ctt cga att cac ccc cag agt tgg gtg cac	4320
Pro Leu Leu Thr Arg Tyr Leu Arg Ile His Pro Gln Ser Trp Val His	
1425 1430 1435 1440	
cag att gcc ctg agg atg gag gtt ctg ggc tgc gag gca cag gac ctc	4368
Gln Ile Ala Leu Arg Met Glu Val Leu Gly Cys Glu Ala Gln Asp Leu	
1445 1450 1455	
tac	4371
Tyr	

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 <211> 1457
 <212> PRT
 <213> Artificial Sequence

<220>
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 Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser
 20 25 30
 Trp Asp Tyr Arg Gln Ser Glu Leu Arg Glu Leu His Val Asp Thr
 35 40 45
 Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
 50 55 60
 Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser
 65 70 75 80
 Val Ala Arg Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile
 85 90 95
 Gln Ala Glu Val Tyr Asp Thr Val Val Thr Leu Lys Asn Met Ala
 100 105 110
 Ser His Pro Val Ser Leu His Ala Val Gly Val Ser Phe Trp Lys Ser
 115 120 125

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Ser	Glu	Gly	Ala	Glu	Tyr	Glu	Asp	His	Thr	Ser	Gln	Arg	Glu	Lys	Glu
130						135					140				
Asp	Asp	Lys	Val	Leu	Pro	Gly	Lys	Ser	Gln	Thr	Tyr	Val	Trp	Gln	Val
145					150					155					160
Leu	Lys	Glu	Asn	Gly	Pro	Thr	Ala	Ser	Asp	Pro	Pro	Cys	Leu	Thr	Tyr
				165					170					175	
Ser	Tyr	Leu	Ser	His	Val	Asp	Leu	Val	Lys	Asp	Leu	Asn	Ser	Gly	Leu
			180					185					190		
Ile	Gly	Ala	Leu	Leu	Val	Cys	Arg	Glu	Gly	Ser	Leu	Thr	Arg	Glu	Arg
		195					200					205			
Thr	Gln	Asn	Leu	His	Glu	Phe	Val	Leu	Leu	Phe	Ala	Val	Phe	Asp	Glu
	210					215					220				
Gly	Lys	Ser	Trp	His	Ser	Ala	Arg	Asn	Asp	Ser	Trp	Thr	Arg	Ala	Met
225					230					235					240
Asp	Pro	Ala	Pro	Ala	Arg	Ala	Gln	Pro	Ala	Met	His	Thr	Val	Asn	Gly
				245					250					255	
Tyr	Val	Asn	Arg	Ser	Leu	Pro	Gly	Leu	Ile	Gly	Cys	His	Lys	Lys	Ser
			260					265					270		
Val	Tyr	Trp	His	Val	Ile	Gly	Met	Gly	Thr	Ser	Pro	Glu	Val	His	Ser
		275					280					285			
Ile	Phe	Leu	Glu	Gly	His	Thr	Phe	Leu	Val	Arg	His	His	Arg	Gln	Ala
	290					295					300				
Ser	Leu	Glu	Ile	Ser	Pro	Leu	Thr	Phe	Leu	Thr	Ala	Gln	Thr	Phe	Leu
305					310					315					320
Met	Asp	Leu	Gly	Gln	Phe	Leu	Leu	Phe	Cys	His	Ile	Ser	Ser	His	His
				325					330					335	
His	Gly	Gly	Met	Glu	Ala	His	Val	Arg	Val	Glu	Ser	Cys	Ala	Glu	Glu
			340					345					350		
Pro	Gln	Leu	Arg	Arg	Lys	Ala	Asp	Glu	Glu	Glu	Asp	Tyr	Asp	Asp	Asn
			355				360					365			
Leu	Tyr	Asp	Ser	Asp	Met	Asp	Val	Val	Arg	Leu	Asp	Gly	Asp	Asp	Val
	370					375					380				
Ser	Pro	Phe	Ile	Gln	Ile	Arg	Ser	Val	Ala	Lys	Lys	His	Pro	Lys	Thr
385					390					395					400
Trp	Val	His	Tyr	Ile	Ala	Ala	Glu	Glu	Glu	Asp	Trp	Asp	Tyr	Ala	Pro
				405					410					415	
Leu	Val	Leu	Ala	Pro	Asp	Asp	Arg	Ser	Tyr	Lys	Ser	Gln	Tyr	Leu	Asn
			420					425					430		
Asn	Gly	Pro	Gln	Arg	Ile	Gly	Arg	Lys	Tyr	Lys	Lys	Val	Arg	Phe	Met
		435					440					445			
Ala	Tyr	Thr	Asp	Glu	Thr	Phe	Lys	Thr	Arg	Glu	Ala	Ile	Gln	His	Glu
	450					455					460				
Ser	Gly	Ile	Leu	Gly	Pro	Leu	Leu	Tyr	Gly	Glu	Val	Gly	Asp	Thr	Leu
465					470					475					480
Leu	Ile	Ile	Phe	Lys	Asn	Gln	Ala	Ser	Arg	Pro	Tyr	Asn	Ile	Tyr	Pro
				485					490					495	
His	Gly	Ile	Thr	Asp	Val	Arg	Pro	Leu	Tyr	Ser	Arg	Arg	Leu	Pro	Lys
			500					505					510		
Gly	Val	Lys	His	Leu	Lys	Asp	Phe	Pro	Ile	Leu	Pro	Gly	Glu	Ile	Phe
		515					520					525			
Lys	Tyr	Lys	Trp	Thr	Val	Thr	Val	Glu	Asp	Gly	Pro	Thr	Lys	Ser	Asp
	530					535					540				
Pro	Arg	Cys	Leu	Thr	Arg	Tyr	Tyr	Ser	Ser	Phe	Val	Asn	Met	Glu	Arg
545					550					555					560
Asp	Leu	Ala	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Ile	Cys	Tyr	Lys	Glu	
				565					570					575	
Ser	Val	Asp	Gln	Arg	Gly	Asn	Gln	Ile	Met	Ser	Asp	Lys	Arg	Asn	Val
			580					585					590		
Ile	Leu	Phe	Ser	Val	Phe	Asp	Glu	Asn	Arg	Ser	Trp	Tyr	Leu	Thr	Glu
		595					600					605			
Asn	Ile	Gln	Arg	Phe	Leu	Pro	Asn	Pro	Ala	Gly	Val	Gln	Leu	Glu	Asp
	610					615					620				
Pro	Glu	Phe	Gln	Ala	Ser	Asn	Ile	Met	His	Ser	Ile	Asn	Gly	Tyr	Val

625	SEQUENCE LISTING 15097-5														640
Phe	Asp	Ser	Leu	Gln	Leu	Ser	Val	Cys	Leu	His	Glu	Val	Ala	Tyr	Trp
				645					650					655	
Tyr	Ile	Leu	Ser	Ile	Gly	Ala	Gln	Thr	Asp	Phe	Leu	Ser	Val	Phe	Phe
			660						665					670	
Ser	Gly	Tyr	Thr	Phe	Lys	His	Lys	Met	Val	Tyr	Glu	Asp	Thr	Leu	Thr
			675						680					685	
Leu	Phe	Pro	Phe	Ser	Gly	Glu	Thr	Val	Phe	Met	Ser	Met	Glu	Asn	Pro
						695					700				
Gly	Leu	Trp	Ile	Leu	Gly	Cys	His	Asn	Ser	Asp	Phe	Arg	Asn	Arg	Gly
					710					715				720	
Met	Thr	Ala	Leu	Leu	Lys	Val	Ser	Ser	Cys	Asp	Lys	Asn	Thr	Gly	Asp
					725				730					735	
Tyr	Tyr	Glu	Asp	Ser	Tyr	Glu	Asp	Ile	Ser	Ala	Tyr	Leu	Leu	Ser	Lys
			740					745					750		
Asn	Asn	Ala	Ile	Glu	Pro	Arg	Ser	Phe	Ser	Gln	Asn	Pro	Pro	Val	Leu
			755									765			
Lys	Arg	His	Gln	Arg	Glu	Ile	Thr	Arg	Thr	Thr	Leu	Gln	Ser	Asp	Gln
						775						780			
Glu	Glu	Ile	Asp	Tyr	Asp	Asp	Thr	Ile	Ser	Val	Glu	Met	Lys	Lys	Glu
					790					795					800
Asp	Phe	Asp	Ile	Tyr	Asp	Glu	Asp	Glu	Asn	Gln	Ser	Pro	Arg	Ser	Phe
					805				810					815	
Gln	Lys	Lys	Thr	Arg	His	Tyr	Phe	Ile	Ala	Ala	Val	Glu	Arg	Leu	Trp
			820					825						830	
Asp	Tyr	Gly	Met	Ser	Ser	Ser	Pro	His	Val	Leu	Arg	Asn	Arg	Ala	Gln
			835				840					845			
Ser	Gly	Ser	Val	Pro	Gln	Phe	Lys	Lys	Val	Val	Phe	Gln	Glu	Phe	Thr
						855					860				
Asp	Gly	Ser	Phe	Thr	Gln	Pro	Leu	Tyr	Arg	Gly	Glu	Leu	Asn	Glu	His
					870					875					880
Leu	Gly	Leu	Leu	Gly	Pro	Tyr	Ile	Arg	Ala	Glu	Val	Glu	Asp	Asn	Ile
				885					890					895	
Met	Val	Thr	Phe	Arg	Asn	Gln	Ala	Ser	Arg	Pro	Tyr	Ser	Phe	Tyr	Ser
			900					905					910		
Ser	Leu	Ile	Ser	Tyr	Glu	Glu	Asp	Gln	Arg	Gln	Gly	Ala	Glu	Pro	Arg
							920					925			
Lys	Asn	Phe	Val	Lys	Pro	Asn	Glu	Thr	Lys	Thr	Tyr	Phe	Trp	Lys	Val
						935					940				
Gln	His	His	Met	Ala	Pro	Thr	Lys	Asp	Glu	Phe	Asp	Cys	Lys	Ala	Trp
					950					955					960
Ala	Tyr	Phe	Ser	Asp	Val	Asp	Leu	Glu	Lys	Asp	Val	His	Ser	Gly	Leu
				965					970					975	
Ile	Gly	Pro	Leu	Leu	Val	Cys	His	Thr	Asn	Thr	Leu	Asn	Pro	Ala	His
			980					985					990		
Gly	Arg	Gln	Val												

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Thr Leu Phe Leu Val Tyr Ser Asn Lys Cys Gln Thr Pro Leu Gly Met
 1140 1145 1150
 Ala Ser Gly His Ile Arg Asp Phe Gln Ile Thr Ala Ser Gly Gln Tyr
 1155 1160 1165
 Gly Gln Trp Ala Pro Lys Leu Ala Arg Leu His Tyr Ser Gly Ser Ile
 1170 1175 1180
 Asn Ala Trp Ser Thr Lys Glu Pro Phe Ser Trp Ile Lys Val Asp Leu
 1185 1190 1195 1200
 Leu Ala Pro Met Ile Ile His Gly Ile Lys Thr Gln Gly Ala Arg Gln
 1205 1210 1215
 Lys Phe Ser Ser Leu Tyr Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu
 1220 1225 1230
 Asp Gly Lys Lys Trp Gln Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu
 1235 1240 1245
 Met Val Phe Phe Gly Asn Val Asp Ser Ser Gly Ile Lys His Asn Ile
 1250 1255 1260
 Phe Asn Pro Pro Ile Ile Ala Arg Tyr Ile Arg Leu His Pro Thr His
 1265 1270 1275 1280
 Tyr Ser Ile Arg Ser Thr Leu Arg Met Glu Leu Met Gly Cys Asp Leu
 1285 1290 1295
 Asn Ser Cys Ser Met Pro Leu Gly Met Glu Ser Lys Ala Ile Ser Asp
 1300 1305 1310
 Ala Gln Ile Thr Ala Ser Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp
 1315 1320 1325
 Ser Pro Ser Lys Ala Arg Leu His Leu Gln Gly Arg Ser Asn Ala Trp
 1330 1335 1340
 Arg Pro Gln Val Asn Asn Pro Lys Glu Trp Leu Gln Val Asp Phe Gln
 1345 1350 1355 1360
 Lys Thr Met Lys Val Thr Gly Val Thr Thr Gln Gly Val Lys Ser Leu
 1365 1370 1375
 Leu Thr Ser Met Tyr Val Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp
 1380 1385 1390
 Gly His Gln Trp Thr Leu Phe Phe Gln Asn Gly Lys Val Lys Val Phe
 1395 1400 1405
 Gln Gly Asn Gln Asp Ser Phe Thr Pro Val Val Asn Ser Leu Asp Pro
 1410 1415 1420
 Pro Leu Leu Thr Arg Tyr Leu Arg Ile His Pro Gln Ser Trp Val His
 1425 1430 1435 1440
 Gln Ile Ala Leu Arg Met Glu Val Leu Gly Cys Glu Ala Gln Asp Leu
 1445 1450 1455
 Tyr

<210> 18
 <211> 4401
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> hybrid human and porcine factor VIII sequence

<221> CDS
 <222> (1)...(4401)
 <223> HP47/OL -- factor VIII having the following
 domains: Alp-A2h-app-A3p-C1h-C2h

<400> 18
 atg cag cta gag ctc tcc acc tgt gtc ttt ctg tgt ctc ttg cca ctc 48
 Met Gln Leu Glu Leu Ser Thr Cys Val Phe Leu Cys Leu Leu Pro Leu
 1 5 10 15
 ggc ttt agt gcc atc agg aga tac tac ctg ggc gca gtg gaa ctg tcc 96

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Gly	Phe	Ser	Ala	Ile	Arg	Arg	Tyr	Tyr	Leu	Gly	Ala	Val	Glu	Leu	Ser		
			20					25					30				
tgg	gac	tac	cgg	caa	agt	gaa	ctc	ctc	cgt	gag	ctg	cac	gtg	gac	acc	144	
Trp	Asp	Tyr	Arg	Gln	Ser	Glu	Leu	Leu	Arg	Glu	Leu	His	Val	Asp	Thr		
		35					40					45					
aga	ttt	cct	gct	aca	gcg	cca	gga	gct	ctt	ccg	ttg	ggc	ccg	tca	gtc	192	
Arg	Phe	Pro	Ala	Thr	Ala	Pro	Gly	Ala	Leu	Pro	Leu	Gly	Pro	Ser	Val		
	50					55				60							
ctg	tac	aaa	aag	act	gtg	ttc	gta	gag	ttc	acg	gat	caa	ctt	ttc	agc	240	
Leu	Tyr	Lys	Lys	Thr	Val	Phe	Val	Glu	Phe	Thr	Asp	Gln	Leu	Phe	Ser		
	65				70					75					80		
gtt	gcc	agg	ccc	agg	cca	cca	tgg	atg	ggg	ctg	ctg	ggg	cct	acc	atc	288	
Val	Ala	Arg	Pro	Arg	Pro	Pro	Trp	Met	Gly	Leu	Leu	Gly	Pro	Thr	Ile		
				85					90					95			
cag	gct	gag	gtt	tac	gac	acg	gtg	gtc	gtt	acc	ctg	aag	aac	atg	gct	336	
Gln	Ala	Glu	Val	Tyr	Asp	Thr	Val	Val	Val	Thr	Leu	Lys	Asn	Met	Ala		
			100					105					110				
tct	cat	ccc	gtt	agt	ctt	cac	gct	gtc	ggc	gtc	tcc	ttc	tgg	aaa	tct	384	
Ser	His	Pro	Val	Ser	Leu	His	Ala	Val	Gly	Val	Ser	Phe	Trp	Lys	Ser		
		115					120					125					
tcc	gaa	ggc	gct	gaa	tat	gag	gat	cac	acc	agc	caa	agg	gag	aag	gaa	432	
Ser	Glu	Gly	Ala	Glu	Tyr	Glu	Asp	His	Thr	Ser	Gln	Arg	Glu	Lys	Glu		
	130					135					140						
gac	gat	aaa	gtc	ctt	ccc	ggg	aaa	agc	caa	acc	tac	gtc	tgg	cag	gtc	480	
Asp	Asp	Lys	Val	Leu	Pro	Gly	Lys	Ser	Gln	Thr	Tyr	Val	Trp	Gln	Val		
	145				150					155					160		
ctg	aaa	gaa	aat	ggg	cca	aca	gcc	tct	gac	cca	cca	tgt	ctt	acc	tac	528	
Leu	Lys	Glu	Asn	Gly	Pro	Thr	Ala	Ser	Asp	Pro	Pro	Cys	Leu	Thr	Tyr		
				165					170					175			
tca	tac	ctg	tct	cac	gtg	gac	ctg	gtg	aaa	gac	ctg	aat	tcg	ggc	ctc	576	
Ser	Tyr	Leu	Ser	His	Val	Asp	Leu	Val	Lys	Asp	Leu	Asn	Ser	Gly	Leu		
			180					185					190				
att	gga	gcc	ctg	ctg	gtt	tgt	aga	gaa	ggg	agt	ctg	acc	aga	gaa	agg	624	
Ile	Gly	Ala	Leu	Leu	Val	Cys	Arg	Glu	Gly	Ser	Leu	Thr	Arg	Glu	Arg		
		195					200					205					
acc	cag	aac	ctg	cac	gaa	ttt	gta	cta	ctt	ttt	gct	gtc	ttt	gat	gaa	672	
Thr	Gln	Asn	Leu	His	Glu	Phe	Val	Leu	Leu	Phe	Ala	Val	Phe	Asp	Glu		
	210					215					220						
ggg	aaa	agt	tgg	cac	tca	gca	aga	aat	gac	tcc	tgg	aca	cgg	gcc	atg	720	
Gly	Lys	Ser	Trp	His	Ser	Ala	Arg	Asn	Asp	Ser	Trp	Thr	Arg	Ala	Met		
	225				230					235					240		
gat	ccc	gca	cct	gcc	agg	gcc	cag	cct	gca	atg	cac	aca	gtc	aat	ggc	768	
Asp	Pro	Ala	Pro	Ala	Arg	Ala	Gln	Pro	Ala	Met	His	Thr	Val	Asn	Gly		
				245					250					255			
tat	gtc	aac	agg	tct	ctg	cca	ggg	ctg	atc	gga	tgt	cat	aag	aaa	tca	816	
Tyr	Val	Asn	Arg	Ser	Leu	Pro	Gly	Leu	Ile	Gly	Cys	His	Lys	Lys	Ser		
			260					265					270				

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gtc	tac	tgg	cac	gtg	att	gga	atg	ggc	acc	agc	ccg	gaa	gtg	cac	tcc	864
Val	Tyr	Trp	His	Val	Ile	Gly	Met	Gly	Thr	Ser	Pro	Glu	Val	His	Ser	
		275					280					285				
att	ttt	ctt	gaa	ggc	cac	acg	ttt	ctc	gtg	agg	cac	cat	cgc	cag	gct	912
Ile	Phe	Leu	Glu	Gly	His	Thr	Phe	Leu	Val	Arg	His	His	Arg	Gln	Ala	
	290					295					300					
tcc	ttg	gag	atc	tcg	cca	cta	act	ttc	ctc	act	gct	cag	aca	ttc	ctg	960
Ser	Leu	Glu	Ile	Ser	Pro	Leu	Thr	Phe	Leu	Thr	Ala	Gln	Thr	Phe	Leu	
305					310					315					320	
atg	gac	ctt	ggc	cag	ttc	cta	ctg	ttt	tgt	cat	atc	tct	tcc	cac	cac	1008
Met	Asp	Leu	Gly	Gln	Phe	Leu	Leu	Phe	Cys	His	Ile	Ser	Ser	His	His	
				325					330					335		
cat	ggt	ggc	atg	gag	gct	cac	gtc	aga	gta	gaa	agc	tgc	gcc	gag	gag	1056
His	Gly	Gly	Met	Glu	Ala	His	Val	Arg	Val	Glu	Ser	Cys	Ala	Glu	Glu	
			340					345					350			
ccc	cag	ctg	cgg	agg	aaa	gct	gat	gaa	gag	gaa	gat	tat	gat	gac	aat	1104
Pro	Gln	Leu	Arg	Arg	Lys	Ala	Asp	Glu	Glu	Glu	Asp	Tyr	Asp	Asp	Asn	
		355					360					365				
ttg	tac	gac	tcg	gac	atg	gac	gtg	gtc	cgg	ctc	gat	ggt	gac	gac	gtg	1152
Leu	Tyr	Asp	Ser	Asp	Met	Asp	Val	Val	Arg	Leu	Asp	Gly	Asp	Asp	Val	
	370					375					380					
tct	ccc	ttt	atc	caa	atc	cgc	tca	gtt	gcc	aag	aag	cat	cct	aaa	act	1200
Ser	Pro	Phe	Ile	Gln	Ile	Arg	Ser	Val	Ala	Lys	Lys	His	Pro	Lys	Thr	
385					390					395					400	
tgg	gta	cat	tac	att	gct	gct	gaa	gag	gag	gac	tgg	gac	tat	gct	ccc	1248
Trp	Val	His	Tyr	Ile	Ala	Ala	Glu	Glu	Glu	Asp	Trp	Asp	Tyr	Ala	Pro	
				405					410					415		
tta	gtc	ctc	gcc	ccc	gat	gac	aga	agt	tat	aaa	agt	caa	tat	ttg	aac	1296
Leu	Val	Leu	Ala	Pro	Asp	Asp	Arg	Ser	Tyr	Lys	Ser	Gln	Tyr	Leu	Asn	
			420					425					430			
aat	ggc	cct	cag	cgg	att	ggt	agg	aag	tac	aaa	aaa	gtc	cga	ttt	atg	1344
Asn	Gly	Pro	Gln	Arg	Ile	Gly	Arg	Lys	Tyr	Lys	Lys	Val	Arg	Phe	Met	
		435					440					445				
gca	tac	aca	gat	gaa	acc	ttt	aag	acg	cgt	gaa	gct	att	cag	cat	gaa	1392
Ala	Tyr	Thr	Asp	Glu	Thr	Phe	Lys	Thr	Arg	Glu	Ala	Ile	Gln	His	Glu	
	450					455					460					
tca	gga	atc	ttg	gga	cct	tta	ctt	tat	ggg	gaa	gtt	gga	gac	aca	ctg	1440
Ser	Gly	Ile	Leu	Gly	Pro	Leu	Leu	Tyr	Gly	Glu	Val	Gly	Asp	Thr	Leu	
465					470					475					480	
ttg	att	ata	ttt	aag	aat	caa	gca	agc	aga	cca	tat	aac	atc	tac	cct	1488
Leu	Ile	Ile	Phe	Lys	Asn	Gln	Ala	Ser	Arg	Pro	Tyr	Asn	Ile	Tyr	Pro	
				485					490					495		
cac	gga	atc	act	gat	gtc	cgt	cct	ttg	tat	tca	agg	aga	tta	cca	aaa	1536
His	Gly	Ile	Thr	Asp	Val	Arg	Pro	Leu	Tyr	Ser	Arg	Arg	Leu	Pro	Lys	
			500					505					510			
ggt	gta	aaa	cat	ttg	aag	gat	ttt	cca	att	ctg	cca	gga	gaa	ata	ttc	1584
Gly	Val	Lys	His	Leu	Lys	Asp	Phe	Pro	Ile	Leu	Pro	Gly	Glu	Ile	Phe	
		515					520					525				

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aaa	tat	aaa	tgg	aca	gtg	act	gta	gaa	gat	ggg	cca	act	aaa	tca	gat	1632
Lys	Tyr	Lys	Trp	Thr	Val	Thr	Val	Glu	Asp	Gly	Pro	Thr	Lys	Ser	Asp	
	530					535					540					
ccg	cgg	tgc	ctg	acc	cgc	tat	tac	tct	agt	ttc	gtt	aat	atg	gag	aga	1680
Pro	Arg	Cys	Leu	Thr	Arg	Tyr	Tyr	Ser	Ser	Phe	Val	Asn	Met	Glu	Arg	
545					550					555					560	
gat	cta	gct	tca	gga	ctc	att	ggc	cct	ctc	ctc	atc	tgc	tac	aaa	gaa	1728
Asp	Leu	Ala	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile	Cys	Tyr	Lys	Glu	
				565					570					575		
tct	gta	gat	caa	aga	gga	aac	cag	ata	atg	tca	gac	aag	agg	aat	gtc	1776
Ser	Val	Asp	Gln	Arg	Gly	Asn	Gln	Ile	Met	Ser	Asp	Lys	Arg	Asn	Val	
			580					585					590			
atc	ctg	ttt	tct	gta	ttt	gat	gag	aac	cga	agc	tgg	tac	ctc	aca	gag	1824
Ile	Leu	Phe	Ser	Val	Phe	Asp	Glu	Asn	Arg	Ser	Trp	Tyr	Leu	Thr	Glu	
		595					600					605				
aat	ata	caa	cgc	ttt	ctc	ccc	aat	cca	gct	gga	gtg	cag	ctt	gag	gat	1872
Asn	Ile	Gln	Arg	Phe	Leu	Pro	Asn	Pro	Ala	Gly	Val	Gln	Leu	Glu	Asp	
	610					615					620					
cca	gag	ttc	caa	gcc	tcc	aac	atc	atg	cac	agc	atc	aat	ggc	tat	gtt	1920
Pro	Glu	Phe	Gln	Ala	Ser	Asn	Ile	Met	His	Ser	Ile	Asn	Gly	Tyr	Val	
625					630					635					640	
ttt	gat	agt	ttg	cag	ttg	tca	gtt	tgt	ttg	cat	gag	gtg	gca	tac	tgg	1968
Phe	Asp	Ser	Leu	Gln	Leu	Ser	Val	Cys	Leu	His	Glu	Val	Ala	Tyr	Trp	
				645					650					655		
tac	att	cta	agc	att	gga	gca	cag	act	gac	ttc	ctt	tct	gtc	ttc	ttc	2016
Tyr	Ile	Leu	Ser	Ile	Gly	Ala	Gln	Thr	Asp	Phe	Leu	Ser	Val	Phe	Phe	
			660					665					670			
tct	gga	tat	acc	ttc	aaa	cac	aaa	atg	gtc	tat	gaa	gac	aca	ctc	acc	2064
Ser	Gly	Tyr	Thr	Phe	Lys	His	Lys	Met	Val	Tyr	Glu	Asp	Thr	Leu	Thr	
		675					680					685				
cta	ttc	cca	ttc	tca	gga	gaa	act	gtc	ttc	atg	tcg	atg	gaa	aac	cca	2112
Leu	Phe	Pro	Phe	Ser	Gly	Glu	Thr	Val	Phe	Met	Ser	Met	Glu	Asn	Pro	
	690					695					700					
ggt	cta	tgg	att	ctg	ggg	tgc	cac	aac	tca	gac	ttt	cgg	aac	aga	ggc	2160
Gly	Leu	Trp	Ile	Leu	Gly	Cys	His	Asn	Ser	Asp	Phe	Arg	Asn	Arg	Gly	
705					710					715					720	
atg	acc	gcc	tta	ctg	aag	gtt	tct	agt	tgt	gac	aag	aac	act	ggt	gat	2208
Met	Thr	Ala	Leu	Leu	Lys	Val	Ser	Ser	Cys	Asp	Lys	Asn	Thr	Gly	Asp	
				725					730					735		
tat	tac	gag	gac	agt	tat	gaa	gat	att	tca	gca	tac	ttg	ctg	agt	aaa	2256
Tyr	Tyr	Glu	Asp	Ser	Tyr	Glu	Asp	Ile	Ser	Ala	Tyr	Leu	Leu	Ser	Lys	
			740					745					750			
aac	aat	gcc	att	gaa	cct	agg	agc	ttt	gcc	cag	aat	tca	aga	ccc	cct	2304
Asn	Asn	Ala	Ile	Glu	Pro	Arg	Ser	Phe	Ala	Gln	Asn	Ser	Arg	Pro	Pro	
		755					760					765				
agt	gcg	agc	gct	cca	aag	cct	ccg	gtc	ctg	cga	cgg	cat	cag	agg	gac	2352
Ser	Ala	Ser	Ala	Pro	Lys	Pro	Pro	Val	Leu	Arg	Arg	His	Gln	Arg	Asp	

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770	775	780	
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gat atc ttc tca act gaa acg aag gga gaa gat ttt gac att tac ggt Asp Ile Phe Ser Thr Glu Thr Lys Gly Glu Asp Phe Asp Ile Tyr Gly 805 810 815			2448
gag gat gaa aat cag gac cct cgc agc ttt cag aag aga acc cga cac Glu Asp Glu Asn Gln Asp Pro Arg Ser Phe Gln Lys Arg Thr Arg His 820 825 830			2496
tat ttc att gct gcg gtg gag cag ctc tgg gat tac ggg atg agc gaa Tyr Phe Ile Ala Ala Val Glu Gln Leu Trp Asp Tyr Gly Met Ser Glu 835 840 845			2544
tcc ccc cgg gcg cta aga aac agg gct cag aac gga gag gtg cct cgg Ser Pro Arg Ala Leu Arg Asn Arg Ala Gln Asn Gly Glu Val Pro Arg 850 855 860			2592
ttc aag aag gtg gtc ttc cgg gaa ttt gct gac ggc tcc ttc acg cag Phe Lys Lys Val Val Phe Arg Glu Phe Ala Asp Gly Ser Phe Thr Gln 865 870 880			2640
ccg tcg tac cgc ggg gaa ctc aac aaa cac ttg ggg ctc ttg gga ccc Pro Ser Tyr Arg Gly Glu Leu Asn Lys His Leu Gly Leu Leu Gly Pro 885 890 895			2688
tac atc aga gcg gaa gtt gaa gac aac atc atg gta act ttc aaa aac Tyr Ile Arg Ala Glu Val Glu Asp Asn Ile Met Val Thr Phe Lys Asn 900 905 910			2736
cag gcg tct cgt ccc tat tcc ttc tac tcg agc ctt att tct tat ccg Gln Ala Ser Arg Pro Tyr Ser Phe Tyr Ser Ser Leu Ile Ser Tyr Pro 915 920 925			2784
gat gat cag gag caa ggg gca gaa cct cga cac aac ttc gtc cag cca Asp Asp Gln Glu Gln Gly Ala Glu Pro Arg His Asn Phe Val Gln Pro 930 935 940			2832
aat gaa acc aga act tac ttt tgg aaa gtg cag cat cac atg gca ccc Asn Glu Thr Arg Thr Tyr Phe Trp Lys Val Gln His His Met Ala Pro 945 950 955 960			2880
aca gaa gac gag ttt gac tgc aaa gcc tgg gcc tac ttt tct gat gtt Thr Glu Asp Glu Phe Asp Cys Lys Ala Trp Ala Tyr Phe Ser Asp Val 965 970 975			2928
gac ctg gaa aaa gat gtg cac tca ggc ttg atc ggc ccc ctt ctg atc Asp Leu Glu Lys Asp Val His Ser Gly Leu Ile Gly Pro Leu Leu Ile 980 985 990			2976
tgc cgc gcc aac acc ctg aac gct gct cac ggt aga caa gtg acc gtg Cys Arg Ala Asn Thr Leu Asn Ala Ala His Gly Arg Gln Val Thr Val 995 1000 1005			3024
caa gaa ttt gct ctg ttt ttc act att ttt gat gag aca aag agc tgg Gln Glu Phe Ala Leu Phe Phe Thr Ile Phe Asp Glu Thr Lys Ser Trp 1010 1015 1020			3072
tac ttc act gaa aat gtg gaa agg aac tgc cgg gcc ccc tgc cat ctg			3120

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Tyr 1025	Phe	Thr	Glu	Asn	Val 1030	Glu	Arg	Asn	Cys	Arg 1035	Ala	Pro	Cys	His	Leu 1040	
cag Gln	atg Met	gag Glu	gac Asp	ccc Pro	act Thr	ctg Leu	aaa Lys	gaa Glu	aac Asn	tat Tyr	cgc Arg	ttc Phe	cat His	gca Ala	atc Ile	3168
aat Asn	ggc Gly	tat Tyr	gtg Val 1060	atg Met	gat Asp	aca Thr	ctc Leu	cct Pro	ggc Gly 1065	tta Leu	gta Val	atg Met	gct Ala 1070	cag Gln	aat Asn	3216
caa Gln	agg Arg	atc Ile	cga Arg	tgg Trp	tat Tyr	ctg Leu	ctc Leu	agc Ser	atg Met	ggc Gly	agc Ser	aat Asn	gaa Glu	aat Asn	atc Ile	3264
cat His	tcg Ser	att Ile	cat His	ttt Phe	agc Ser	gga Gly 1095	cac His	gtg Val	ttc Phe	agt Ser	gta Val	cgg Arg	aaa Lys	aag Lys	gag Glu	3312
gag Glu 1105	tat Tyr	aaa Lys	atg Met	gcc Ala	gtg Val 1110	tac Tyr	aat Asn	ctc Leu	tat Tyr	ccg Pro	ggt Gly	gtc Val	ttt Phe	gag Glu	aca Thr 1120	3360
gtg Val	gaa Glu	atg Met	cta Leu	ccg Pro	tcc Ser	aaa Lys	gtt Val	gga Gly	att Ile	tgg Trp	cga Arg	ata Ile	gaa Glu	tgc Cys	ctg Leu 1135	3408
att Ile	ggc Gly	gag Glu	cac His	ctg Leu	caa Gln	gct Ala	ggg Gly	atg Met	agc Ser	acg Thr	act Thr	ttc Phe	ctg Leu	gtg Val	tac Tyr 1150	3456
agc Ser	aag Lys	aag Lys	tgt Cys	cag Gln	act Thr	ccc Pro	ctg Leu	gga Gly	atg Met	gct Ala	tct Ser	gga Gly	cac His	att Ile	aga Arg	3504
gat Asp	ttt Phe 1170	cag Gln	att Ile	aca Thr	gct Ala	tca Ser	gga Gly	caa Gln	tat Tyr	gga Gly	cag Gln	tgg Trp	gcc Ala	cca Pro	aag Lys	3552
ctg Leu 1185	gcc Ala	aga Arg	ctt Leu	cat His	tat Tyr 1190	tcc Ser	gga Gly	tca Ser	atc Ile	aat Asn	gcc Ala	tgg Trp	agc Ser	acc Thr	aag Lys 1200	3600
gag Glu	ccc Pro	ttt Phe	tct Ser	tgg Trp	atc Ile	aag Lys	gtg Val	gat Asp	ctg Leu	ttg Leu	gca Ala	cca Pro	atg Met	att Ile	att Ile 1215	3648
cac His	ggc Gly	atc Ile	aag Lys	acc Thr	cag Gln	ggt Gly	gcc Ala	cgt Arg	cag Gln	aag Lys	ttc Phe	tcc Ser	agc Ser	ctc Leu	tac Tyr 1230	3696
atc Ile	tct Ser	cag Gln	ttt Phe	atc Ile	atc Ile	atg Met	tat Tyr 1240	agt Ser	ctt Leu	gat Asp	ggg Gly	aag Lys	aag Lys	tgg Trp	cag Gln	3744
act Thr	tat Tyr	cga Arg	gga Gly	aat Asn	tcc Ser	act Thr	gga Gly	acc Thr	tta Leu	atg Met	gtc Val	ttc Phe	ttt Phe	ggc Gly	aat Asn	3792
gtg Val 1265	gat Asp	tca Ser	tct Ser	ggg Gly	ata Ile	aaa Lys	cac His	aat Asn	att Ile	ttt Phe	aac Asn	cct Pro	cca Pro	att Ile	att Ile 1280	3840

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gct cga tac atc cgt ttg cac cca act cat tat agc att cgc agc act	3888
Ala Arg Tyr Ile Arg Leu His Pro Thr His Tyr Ser Ile Arg Ser Thr	
1285 1290 1295	
ctt cgc atg gag ttg atg ggc tgt gat tta aat agt tgc agc atg cca	3936
Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser Cys Ser Met Pro	
1300 1305 1310	
ttg gga atg gag agt aaa gca ata tca gat gca cag att act gct tca	3984
Leu Gly Met Glu Ser Lys Ala Ile Ser Asp Ala Gln Ile Thr Ala Ser	
1315 1320 1325	
tcc tac ttt acc aat atg ttt gcc acc tgg tct cct tca aaa gct cga	4032
Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp Ser Pro Ser Lys Ala Arg	
1330 1335 1340	
ctt cac ctc caa ggg agg agt aat gcc tgg aga cct cag gtg aat aat	4080
Leu His Leu Gln Gly Arg Ser Asn Ala Trp Arg Pro Gln Val Asn Asn	
1345 1350 1355 1360	
cca aaa gag tgg ctg caa gtg gac ttc cag aag aca atg aaa gtc aca	4128
Pro Lys Glu Trp Leu Gln Val Asp Phe Gln Lys Thr Met Lys Val Thr	
1365 1370 1375	
gga gta act act cag gga gta aaa tct ctg ctt acc agc atg tat gtg	4176
Gly Val Thr Thr Gln Gly Val Lys Ser Leu Leu Thr Ser Met Tyr Val	
1380 1385 1390	
aag gag ttc ctc atc tcc agc agt caa gat ggc cat cag tgg act ctc	4224
Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp Gly His Gln Trp Thr Leu	
1395 1400 1405	
ttt ttt cag aat ggc aaa gta aag gtt ttt cag gga aat caa gac tcc	4272
Phe Phe Gln Asn Gly Lys Val Lys Val Phe Gln Gly Asn Gln Asp Ser	
1410 1415 1420	
ttc aca cct gtg gtg aac tct cta gac cca ccg tta ctg act cgc tac	4320
Phe Thr Pro Val Val Asn Ser Leu Asp Pro Pro Leu Leu Thr Arg Tyr	
1425 1430 1435 1440	
ctt cga att cac ccc cag agt tgg gtg cac cag att gcc ctg agg atg	4368
Leu Arg Ile His Pro Gln Ser Trp Val His Gln Ile Ala Leu Arg Met	
1445 1450 1455	
gag gtt ctg ggc tgc gag gca cag gac ctc tac	4401
Glu Val Leu Gly Cys Glu Ala Gln Asp Leu Tyr	
1460 1465	

<210> 19

<211> 1467

<212> PRT

<213> Artificial Sequence

<220>

<223> HP47/OL -- factor VIII having the following domains: A1p-A2h-app-A3p-C1h-C2h

<400> 19

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1				5					10					15	
Gly	Phe	Ser	Ala	Ile	Arg	Arg	Tyr	Tyr	Leu	Gly	Ala	Val	Glu	Leu	Ser
			20					25					30		

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Trp	Asp	Tyr	Arg	Gln	Ser	Glu	Leu	Leu	Arg	Glu	Leu	His	Val	Asp	Thr
		35					40					45			
Arg	Phe	Pro	Ala	Thr	Ala	Pro	Gly	Ala	Leu	Pro	Leu	Gly	Pro	Ser	Val
	50					55					60				
Leu	Tyr	Lys	Lys	Thr	Val	Phe	Val	Glu	Phe	Thr	Asp	Gln	Leu	Phe	Ser
	65				70					75					80
Val	Ala	Arg	Pro	Arg	Pro	Pro	Trp	Met	Gly	Leu	Leu	Gly	Pro	Thr	Ile
				85					90					95	
Gln	Ala	Glu	Val	Tyr	Asp	Thr	Val	Val	Val	Thr	Leu	Lys	Asn	Met	Ala
			100					105					110		
Ser	His	Pro	Val	Ser	Leu	His	Ala	Val	Gly	Val	Ser	Phe	Trp	Lys	Ser
		115					120					125			
Ser	Glu	Gly	Ala	Glu	Tyr	Glu	Asp	His	Thr	Ser	Gln	Arg	Glu	Lys	Glu
	130					135					140				
Asp	Asp	Lys	Val	Leu	Pro	Gly	Lys	Ser	Gln	Thr	Tyr	Val	Trp	Gln	Val
	145				150				155						160
Leu	Lys	Glu	Asn	Gly	Pro	Thr	Ala	Ser	Asp	Pro	Pro	Cys	Leu	Thr	Tyr
			165						170					175	
Ser	Tyr	Leu	Ser	His	Val	Asp	Leu	Val	Lys	Asp	Leu	Asn	Ser	Gly	Leu
		180						185					190		
Ile	Gly	Ala	Leu	Leu	Val	Cys	Arg	Glu	Gly	Ser	Leu	Thr	Arg	Glu	Arg
		195					200					205			
Thr	Gln	Asn	Leu	His	Glu	Phe	Val	Leu	Leu	Phe	Ala	Val	Phe	Asp	Glu
	210					215					220				
Gly	Lys	Ser	Trp	His	Ser	Ala	Arg	Asn	Asp	Ser	Trp	Thr	Arg	Ala	Met
	225				230				235						240
Asp	Pro	Ala	Pro	Ala	Arg	Ala	Gln	Pro	Ala	Met	His	Thr	Val	Asn	Gly
				245					250					255	
Tyr	Val	Asn	Arg	Ser	Leu	Pro	Gly	Leu	Ile	Gly	Cys	His	Lys	Lys	Ser
		260						265					270		
Val	Tyr	Trp	His	Val	Ile	Gly	Met	Gly	Thr	Ser	Pro	Glu	Val	His	Ser
		275					280					285			
Ile	Phe	Leu	Glu	Gly	His	Thr	Phe	Leu	Val	Arg	His	His	Arg	Gln	Ala
	290					295					300				
Ser	Leu	Glu	Ile	Ser	Pro	Leu	Thr	Phe	Leu	Thr	Ala	Gln	Thr	Phe	Leu
	305				310					315					320
Met	Asp	Leu	Gly	Gln	Phe	Leu	Leu	Phe	Cys	His	Ile	Ser	Ser	His	His
				325					330					335	
His	Gly	Gly	Met	Glu	Ala	His	Val	Arg	Val	Glu	Ser	Cys	Ala	Glu	Glu
			340					345					350		
Pro	Gln	Leu	Arg	Arg	Lys	Ala	Asp	Glu	Glu	Glu	Asp	Tyr	Asp	Asp	Asn
		355					360					365			
Leu	Tyr	Asp	Ser	Asp	Met	Asp	Val	Val	Arg	Leu	Asp	Gly	Asp	Asp	Val
	370					375					380				
Ser	Pro	Phe	Ile	Gln	Ile	Arg	Ser	Val	Ala	Lys	Lys	His	Pro	Lys	Thr
	385				390					395					400
Trp	Val	His	Tyr	Ile	Ala	Ala	Glu	Glu	Glu	Asp	Trp	Asp	Tyr	Ala	Pro
				405					410					415	
Leu	Val	Leu	Ala	Pro	Asp	Asp	Arg	Ser	Tyr	Lys	Ser	Gln	Tyr	Leu	Asn
			420					425					430		
Asn	Gly	Pro	Gln	Arg	Ile	Gly	Arg	Lys	Tyr	Lys	Lys	Val	Arg	Phe	Met
		435					440					445			
Ala	Tyr	Thr	Asp	Glu	Thr	Phe	Lys	Thr	Arg	Glu	Ala	Ile	Gln	His	Glu
	450					455					460				
Ser	Gly	Ile	Leu	Gly	Pro	Leu	Leu	Tyr	Gly	Glu	Val	Gly	Asp	Thr	Leu
	465				470				475						480
Leu	Ile	Ile	Phe	Lys	Asn	Gln	Ala	Ser	Arg	Pro	Tyr	Asn	Ile	Tyr	Pro
				485					490					495	
His	Gly	Ile	Thr	Asp	Val	Arg	Pro	Leu	Tyr	Ser	Arg	Arg	Leu	Pro	Lys
			500					505					510		
Gly	Val	Lys	His	Leu	Lys	Asp	Phe	Pro	Ile	Leu	Pro	Gly	Glu	Ile	Phe
		515					520					525			
Lys	Tyr	Lys	Trp	Thr	Val	Thr	Val	Glu	Asp	Gly	Pro	Thr	Lys	Ser	Asp

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530	Pro	Arg	Cys	Leu	Thr	Arg	Tyr	Tyr	Ser	Ser	Phe	Val	Asn	Met	Glu	Arg
545	Asp	Leu	Ala	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Ile	Cys	Tyr	Lys	Glu	
	Ser	Val	Asp	Gln	Arg	Gly	Asn	Gln	Ile	Met	Ser	Asp	Lys	Arg	Asn	Val
	Ile	Leu	Phe	Ser	Val	Phe	Asp	Glu	Asn	Arg	Ser	Trp	Tyr	Leu	Thr	Glu
	Asn	Ile	Gln	Arg	Phe	Leu	Pro	Asn	Pro	Ala	Gly	Val	Gln	Leu	Glu	Asp
	Pro	Glu	Phe	Gln	Ala	Ser	Asn	Ile	Met	His	Ser	Ile	Asn	Gly	Tyr	Val
625	Phe	Asp	Ser	Leu	Gln	Leu	Ser	Val	Cys	Leu	His	Glu	Val	Ala	Tyr	Trp
	Tyr	Ile	Leu	Ser	Ile	Gly	Ala	Gln	Thr	Asp	Phe	Leu	Ser	Val	Phe	Phe
	Ser	Gly	Tyr	Thr	Phe	Lys	His	Lys	Met	Val	Tyr	Glu	Asp	Thr	Leu	Thr
	Leu	Phe	Pro	Phe	Ser	Gly	Glu	Thr	Val	Phe	Met	Ser	Met	Glu	Asn	Pro
	Gly	Leu	Trp	Ile	Leu	Gly	Cys	His	Asn	Ser	Asp	Phe	Arg	Asn	Arg	Gly
705	Met	Thr	Ala	Leu	Leu	Lys	Val	Ser	Ser	Cys	Asp	Lys	Asn	Thr	Gly	Asp
	Tyr	Tyr	Glu	Asp	Ser	Tyr	Glu	Asp	Ile	Ser	Ala	Tyr	Leu	Leu	Ser	Lys
	Asn	Asn	Ala	Ile	Glu	Pro	Arg	Ser	Phe	Ala	Gln	Asn	Ser	Arg	Pro	Pro
	Ser	Ala	Ser	Ala	Pro	Lys	Pro	Val	Leu	Arg	Arg	His	Gln	Arg	Asp	
	Ile	Ser	Leu	Pro	Thr	Phe	Gln	Pro	Glu	Glu	Asp	Lys	Met	Asp	Tyr	Asp
785	Asp	Ile	Phe	Ser	Thr	Glu	Thr	Lys	Gly	Glu	Asp	Phe	Asp	Ile	Tyr	Gly
	Glu	Asp	Glu	Asn	Gln	Asp	Pro	Arg	Ser	Phe	Gln	Lys	Arg	Thr	Arg	His
	Tyr	Phe	Ile	Ala	Ala	Val	Glu	Gln	Leu	Trp	Asp	Tyr	Gly	Met	Ser	Glu
	Ser	Pro	Arg	Ala	Leu	Arg	Asn	Arg	Ala	Gln	Asn	Gly	Glu	Val	Pro	Arg
	Phe	Lys	Lys	Val	Val	Phe	Arg	Glu	Phe	Ala	Asp	Gly	Ser	Phe	Thr	Gln
865	Pro	Ser	Tyr	Arg	Gly	Glu	Leu	Asn	Lys	His	Leu	Gly	Leu	Leu	Gly	Pro
	Tyr	Ile	Arg	Ala	Glu	Val	Glu	Asp	Asn	Ile	Met	Val	Thr	Phe	Lys	Asn
	Gln	Ala	Ser	Arg	Pro	Tyr	Ser	Phe	Tyr	Ser	Ser	Leu	Ile	Ser	Tyr	Pro
	Asp	Asp	Gln	Glu	Gln	Gly	Ala	Glu	Pro	Arg	His	Asn	Phe	Val	Gln	Pro
	Asn	Glu	Thr	Arg	Thr	Tyr	Phe	Trp	Lys	Val	Gln	His	His	Met	Ala	Pro
945	Thr	Glu	Asp	Glu	Phe	Asp	Cys	Lys	Ala	Trp	Ala	Tyr	Phe	Ser	Asp	Val
	Asp	Leu	Glu	Lys	Asp	Val	His	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile
	Cys	Arg	Ala	Asn	Thr	Leu	Asn	Ala	Ala	His	Gly	Arg	Gln	Val	Thr	Val
	Gln	Glu	Phe	Ala	Leu	Phe	Phe	Thr	Ile	Phe	Asp	Glu	Thr	Lys	Ser	Trp
	Tyr	Phe	Thr	Glu	Asn	Val	Glu	Arg	Asn	Cys	Arg	Ala	Pro	Cys	His	Leu
1025																

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Gln Met Glu Asp Pro Thr Leu Lys Glu Asn Tyr Arg Phe His Ala Ile
1045 1050 1055
Asn Gly Tyr Val Met Asp Thr Leu Pro Gly Leu Val Met Ala Gln Asn
1060 1065 1070
Gln Arg Ile Arg Trp Tyr Leu Leu Ser Met Gly Ser Asn Glu Asn Ile
1075 1080 1085
His Ser Ile His Phe Ser Gly His Val Phe Ser Val Arg Lys Lys Glu
1090 1095 1100
Glu Tyr Lys Met Ala Val Tyr Asn Leu Tyr Pro Gly Val Phe Glu Thr
1105 1110 1115 1120
Val Glu Met Leu Pro Ser Lys Val Gly Ile Trp Arg Ile Glu Cys Leu
1125 1130 1135
Ile Gly Glu His Leu Gln Ala Gly Met Ser Thr Thr Phe Leu Val Tyr
1140 1145 1150
Ser Lys Lys Cys Gln Thr Pro Leu Gly Met Ala Ser Gly His Ile Arg
1155 1160 1165
Asp Phe Gln Ile Thr Ala Ser Gly Gln Tyr Gly Gln Trp Ala Pro Lys
1170 1175 1180
Leu Ala Arg Leu His Tyr Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys
1185 1190 1195 1200
Glu Pro Phe Ser Trp Ile Lys Val Asp Leu Leu Ala Pro Met Ile Ile
1205 1210 1215
His Gly Ile Lys Thr Gln Gly Ala Arg Gln Lys Phe Ser Ser Leu Tyr
1220 1225 1230
Ile Ser Gln Phe Ile Ile Met Tyr Ser Leu Asp Gly Lys Lys Trp Gln
1235 1240 1245
Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu Met Val Phe Phe Gly Asn
1250 1255 1260
Val Asp Ser Ser Gly Ile Lys His Asn Ile Phe Asn Pro Pro Ile Ile
1265 1270 1275 1280
Ala Arg Tyr Ile Arg Leu His Pro Thr His Tyr Ser Ile Arg Ser Thr
1285 1290 1295
Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser Cys Ser Met Pro
1300 1305 1310
Leu Gly Met Glu Ser Lys Ala Ile Ser Asp Ala Gln Ile Thr Ala Ser
1315 1320 1325
Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp Ser Pro Ser Lys Ala Arg
1330 1335 1340
Leu His Leu Gln Gly Arg Ser Asn Ala Trp Arg Pro Gln Val Asn Asn
1345 1350 1355 1360
Pro Lys Glu Trp Leu Gln Val Asp Phe Gln Lys Thr Met Lys Val Thr
1365 1370 1375
Gly Val Thr Thr Gln Gly Val Lys Ser Leu Leu Thr Ser Met Tyr Val
1380 1385 1390
Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp Gly His Gln Trp Thr Leu
1395 1400 1405
Phe Phe Gln Asn Gly Lys Val Lys Val Phe Gln Gly Asn Gln Asp Ser
1410 1415 1420
Phe Thr Pro Val Val Asn Ser Leu Asp Pro Pro Leu Leu Thr Arg Tyr
1425 1430 1435 1440
Leu Arg Ile His Pro Gln Ser Trp Val His Gln Ile Ala Leu Arg Met
1445 1450 1455
Glu Val Leu Gly Cys Glu Ala Gln Asp Leu Tyr
1460 1465

<210> 20

<211> 4401

<212> DNA

<213> Artificial Sequence

<220>

<223> hybrid human and porcine factor VIII sequence

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<221> CDS

<222> (1)...(4401)

<223> HP63/OL -- factor VIII variant

<400> 20

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Met Gln Leu Glu Leu Ser Thr Cys Val Phe Leu Cys Leu Leu Pro Leu	
1 5 10 15	
ggc ttt agt gcc atc agg aga tac tac ctg ggc gca gtg gaa ctg tcc	96
Gly Phe Ser Ala Ile Arg Arg Tyr Tyr Leu Gly Ala Val Glu Leu Ser	
20 25 30	
tgg gac tac cgg caa agt gaa ctc ctc cgt gag ctg cac gtg gac acc	144
Trp Asp Tyr Arg Gln Ser Glu Leu Leu Arg Glu Leu His Val Asp Thr	
35 40 45	
aga ttt cct gct aca gcg cca gga gct ctt ccg ttg ggc ccg tca gtc	192
Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val	
50 55 60	
ctg tac aaa aag act gtg ttc gta gag ttc acg gat caa ctt ttc agc	240
Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser	
65 70 75 80	
gtt gcc agg ccc agg cca cca tgg atg ggt ctg ctg ggt cct acc atc	288
Val Ala Arg Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile	
85 90 95	
cag gct gag gtt tac gac acg gtg gtc gtt acc ctg aag aac atg gct	336
Gln Ala Glu Val Tyr Asp Thr Val Val Val Thr Leu Lys Asn Met Ala	
100 105 110	
tct cat ccc gtt agt ctt cac gct gtc ggc gtc tcc ttc tgg aaa tct	384
Ser His Pro Val Ser Leu His Ala Val Gly Val Ser Phe Trp Lys Ser	
115 120 125	
tcc gaa ggc gct gaa tat gag gat cac acc agc caa agg gag aag gaa	432
Ser Glu Gly Ala Glu Tyr Glu Asp His Thr Ser Gln Arg Glu Lys Glu	
130 135 140	
gac gat aaa gtc ctt ccc ggt aaa agc caa acc tac gtc tgg cag gtc	480
Asp Asp Lys Val Leu Pro Gly Lys Ser Gln Thr Tyr Val Trp Gln Val	
145 150 155 160	
ctg aaa gaa aat ggt cca aca gcc tct gac cca cca tgt ctt acc tac	528
Leu Lys Glu Asn Gly Pro Thr Ala Ser Asp Pro Pro Cys Leu Thr Tyr	
165 170 175	
tca tac ctg tct cac gtg gac ctg gtg aaa gac ctg aat tcg ggc ctc	576
Ser Tyr Leu Ser His Val Asp Leu Val Lys Asp Leu Asn Ser Gly Leu	
180 185 190	
att gga gcc ctg ctg gtt tgt aga gaa ggg agt ctg acc aga gaa agg	624
Ile Gly Ala Leu Leu Val Cys Arg Glu Gly Ser Leu Thr Arg Glu Arg	
195 200 205	
acc cag aac ctg cac gaa ttt gta cta ctt ttt gct gtc ttt gat gaa	672
Thr Gln Asn Leu His Glu Phe Val Leu Leu Phe Ala Val Phe Asp Glu	
210 215 220	
ggg aaa agt tgg cac tca gca aga aat gac tcc tgg aca cgg gcc atg	720

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Gly 225	Lys	Ser	Trp	His	Ser 230	Ala	Arg	Asn	Asp	Ser 235	Trp	Thr	Arg	Ala	Met 240	
gat Asp	ccc Pro	gca Ala	cct Pro	gcc Ala 245	agg Arg	gcc Ala	cag Gln	cct Pro	gca Ala 250	atg Met	cac His	aca Thr	gtc Val	aat Asn 255	ggc Gly	768
tat Tyr	gtc Val	aac Asn	agg Arg 260	tct Ser	ctg Leu	cca Pro	ggg Gly	ctg Leu 265	atc Ile	gga Gly	tgt Cys	cat His	aag Lys 270	aaa Lys	tca Ser	816
gtc Val	tac Tyr	tgg Trp 275	cac His	gtg Val	att Ile	gga Gly	atg Met 280	ggc Gly	acc Thr	agc Ser	ccg Pro	gaa Glu 285	gtg Val	cac His	tcc Ser	864
att Ile	ttt Phe 290	ctt Leu	gaa Glu	ggc Gly	cac His	acg Thr 295	ttt Phe	ctc Leu	gtg Val	agg Arg	cac His 300	cat His	cgc Arg	cag Gln	gct Ala	912
tcc Ser 305	ttg Leu	gag Glu	atc Ile	tcg Ser	cca Pro 310	cta Leu	act Thr	ttc Phe	ctc Leu	act Thr 315	gct Ala	cag Gln	aca Thr	ttc Phe	ctg Leu 320	960
atg Met	gac Asp	ctt Leu	ggc Gly	cag Gln 325	ttc Phe	cta Leu	ctg Leu	ttt Phe	tgt Cys 330	cat His	atc Ile	tct Ser	tcc Ser	cac His 335	cac His	1008
cat His	ggg Gly	ggc Gly	atg Met 340	gag Glu	gct Ala	cac His	gtc Val	aga Arg 345	gta Val	gaa Glu	agc Ser	tgc Cys	gcc Ala 350	gag Glu	gag Glu	1056
ccc Pro	cag Gln	ctg Leu 355	cgg Arg	agg Arg	aaa Lys	gct Ala	gat Asp 360	gaa Glu	gag Glu	gaa Glu	gat Asp	tat Tyr 365	gat Asp	gac Asp	aat Asn	1104
ttg Leu	tac Tyr 370	gac Asp	tcg Ser	gac Asp	atg Met	gac Asp 375	gtg Val	gtc Val	cgg Arg	ctc Leu	gat Asp 380	ggg Gly	gac Asp	gac Asp	gtg Val	1152
tct Ser 385	ccc Pro	ttt Phe	atc Ile	caa Gln 390	atc Ile	cgc Arg	tca Ser	gtt Val	gcc Ala	aag Lys 395	aag Lys	cat His	cct Pro	aaa Lys	act Thr 400	1200
tgg Trp	gta Val	cat His	tac Tyr	att Ile 405	gct Ala	gct Ala	gaa Glu	gag Glu	gag Glu 410	gac Asp	tgg Trp	gac Asp	tat Tyr	gct Ala 415	ccc Pro	1248
tta Leu	gtc Val	ctc Leu	gcc Ala 420	ccc Pro	gat Asp	gac Asp	aga Arg	agt Ser 425	tat Tyr	aaa Lys	agt Ser	caa Gln	tat Tyr 430	ttg Leu	aac Asn	1296
aat Asn	ggc Gly	cct Pro 435	cag Gln	cgg Arg	att Ile	ggg Gly	agg Arg 440	aag Lys	tac Tyr	aaa Lys	aaa Lys	gtc Val 445	cga Arg	ttt Phe	atg Met	1344
gca Ala	tac Tyr 450	aca Thr	gat Asp	gaa Glu	acc Thr	ttt Phe 455	aag Lys	act Thr	cgt Arg	gaa Glu	gct Ala 460	att Ile	cag Gln	cat His	gaa Glu	1392
tca Ser 465	gga Gly	atc Ile	ttg Leu	gga Gly	cct Pro 470	tta Leu	ctt Leu	tat Tyr	ggg Gly 475	gaa Glu	gtt Val	gga Gly	gac Asp	aca Thr	ctg Leu 480	1440

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ttg att ata ttt aag aat caa gca agc aga cca tat aac atc tac cct	1488
Leu Ile Ile Phe Lys Asn Gln Ala Ser Arg Pro Tyr Asn Ile Tyr Pro	
485 490 495	
cac gga atc act gat gtc cgt cct ttg tat tca agg aga tta cca aaa	1536
His Gly Ile Thr Asp Val Arg Pro Leu Tyr Ser Arg Arg Leu Pro Lys	
500 505 510	
ggt gta aaa cat ttg aag gat ttt cca att ctg cca gga gaa ata ttc	1584
Gly Val Lys His Leu Lys Asp Phe Pro Ile Leu Pro Gly Glu Ile Phe	
515 520 525	
aaa tat aaa tgg aca gtg act gta gaa gat ggg cca act aaa tca gat	1632
Lys Tyr Lys Trp Thr Val Thr Val Glu Asp Gly Pro Thr Lys Ser Asp	
530 535 540	
cct cgg tgc ctg acc cgc tat tac tct agt ttc gtt aat atg gag aga	1680
Pro Arg Cys Leu Thr Arg Tyr Tyr Ser Ser Phe Val Asn Met Glu Arg	
545 550 555 560	
gat cta gct tca gga ctc att ggc cct ctc ctc atc tgc tac aaa gaa	1728
Asp Leu Ala Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Tyr Lys Glu	
565 570 575	
tct gta gat caa aga gga aac cag ata atg tca gac aag agg aat gtc	1776
Ser Val Asp Gln Arg Gly Asn Gln Ile Met Ser Asp Lys Arg Asn Val	
580 585 590	
atc ctg ttt tct gta ttt gat gag aac cga agc tgg tac ctc aca gag	1824
Ile Leu Phe Ser Val Phe Asp Glu Asn Arg Ser Trp Tyr Leu Thr Glu	
595 600 605	
aat ata caa cgc ttt ctc ccc aat cca gct gga gtg cag ctt gag gat	1872
Asn Ile Gln Arg Phe Leu Pro Asn Pro Ala Gly Val Gln Leu Glu Asp	
610 615 620	
cca gag ttc caa gcc tcc aac atc atg cac agc atc aat ggc tat gtt	1920
Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val	
625 630 635 640	
ttt gat agt ttg cag ttg tca gtt tgt ttg cat gag gtg gca tac tgg	1968
Phe Asp Ser Leu Gln Leu Ser Val Cys Leu His Glu Val Ala Tyr Trp	
645 650 655	
tac att cta agc att gga gca cag act gac ttc ctt tct gtc ttc ttc	2016
Tyr Ile Leu Ser Ile Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe	
660 665 670	
tct gga tat acc ttc aaa cac aaa atg gtc tat gaa gac aca ctc acc	2064
Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr	
675 680 685	
cta ttc cca ttc tca gga gaa act gtc ttc atg tcg atg gaa aac cca	2112
Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro	
690 695 700	
ggt cta tgg att ctg ggg tgc cac aac tca gac ttt cgg aac aga ggc	2160
Gly Leu Trp Ile Leu Gly Cys His Asn Ser Asp Phe Arg Asn Arg Gly	
705 710 715 720	
atg acc gcc tta ctg aag gtt tct agt tgt gac aag aac act ggt gat	2208
Met Thr Ala Leu Leu Lys Val Ser Ser Cys Asp Lys Asn Thr Gly Asp	
725 730 735	

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tat	tac	gag	gac	agt	tat	gaa	gat	att	tca	gca	tac	ttg	ctg	agt	aaa	2256
Tyr	Tyr	Glu	Asp	Ser	Tyr	Glu	Asp	Ile	Ser	Ala	Tyr	Leu	Leu	Ser	Lys	
		740						745					750			
aac	aat	gcc	att	gaa	cct	agg	agc	ttc	tcc	cag	aat	tca	aga	cac	cct	2304
Asn	Asn	Ala	Ile	Glu	Pro	Arg	Ser	Phe	Ser	Gln	Asn	Ser	Arg	His	Pro	
		755					760					765				
agc	act	agg	tct	caa	aac	cca	cca	gtc	ttg	aaa	cgc	cat	caa	cgg	gaa	2352
Ser	Thr	Arg	Ser	Gln	Asn	Pro	Pro	Val	Leu	Lys	Arg	His	Gln	Arg	Glu	
	770					775					780					
ata	act	cgt	act	act	ctt	cag	tca	gat	caa	gag	gaa	att	gac	tat	gat	2400
Ile	Thr	Arg	Thr	Thr	Leu	Gln	Ser	Asp	Gln	Glu	Glu	Ile	Asp	Tyr	Asp	
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gat	acc	ata	tca	gtt	gaa	atg	aag	aag	gaa	gat	ttt	gac	att	tat	gat	2448
Asp	Thr	Ile	Ser	Val	Glu	Met	Lys	Lys	Glu	Asp	Phe	Asp	Ile	Tyr	Asp	
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gag	gat	gaa	aat	cag	agc	ccc	cgc	agc	ttt	caa	aag	aga	acc	cga	cac	2496
Glu	Asp	Glu	Asn	Gln	Ser	Pro	Arg	Ser	Phe	Gln	Lys	Arg	Thr	Arg	His	
			820					825					830			
tat	ttc	att	gct	gcg	gtg	gag	cag	ctc	tgg	gat	tac	ggg	atg	agc	gaa	2544
Tyr	Phe	Ile	Ala	Ala	Val	Glu	Gln	Leu	Trp	Asp	Tyr	Gly	Met	Ser	Glu	
		835					840					845				
tcc	ccc	cgg	gcg	cta	aga	aac	agg	gct	cag	aac	gga	gag	gtg	cct	cgg	2592
Ser	Pro	Arg	Ala	Leu	Arg	Asn	Arg	Ala	Gln	Asn	Gly	Glu	Val	Pro	Arg	
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ttc	aag	aag	gtg	gtc	ttc	cgg	gaa	ttt	gct	gac	ggc	tcc	ttc	acg	cag	2640
Phe	Lys	Lys	Val	Val	Phe	Arg	Glu	Phe	Ala	Asp	Gly	Ser	Phe	Thr	Gln	
865					870					875					880	
ccg	tcg	tac	cgc	ggg	gaa	ctc	aac	aaa	cac	ttg	ggg	ctc	ttg	gga	ccc	2688
Pro	Ser	Tyr	Arg	Gly	Glu	Leu	Asn	Lys	His	Leu	Gly	Leu	Leu	Gly	Pro	
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Tyr	Ile	Arg	Ala	Glu	Val	Glu	Asp	Asn	Ile	Met	Val	Thr	Phe	Lys	Asn	
			900					905					910			
cag	gcg	tct	cgt	ccc	tat	tcc	ttc	tac	tcg	agc	ctt	att	tct	tat	ccg	2784
Gln	Ala	Ser	Arg	Pro	Tyr	Ser	Phe	Tyr	Ser	Ser	Leu	Ile	Ser	Tyr	Pro	
		915					920					925				
gat	gat	cag	gag	caa	ggg	gca	gaa	cct	cga	aaa	aac	ttt	gtc	aag	cct	2832
Asp	Asp	Gln	Glu	Gln	Gly	Ala	Glu	Pro	Arg	Lys	Asn	Phe	Val	Lys	Pro	
	930					935					940					
aat	gaa	acc	aaa	act	tac	ttt	tgg	aaa	gtg	cag	cat	cac	atg	gca	ccc	2880
Asn	Glu	Thr	Lys	Thr	Tyr	Phe	Trp	Lys	Val	Gln	His	His	Met	Ala	Pro	
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Thr	Glu	Asp	Glu	Phe	Asp	Cys	Lys	Ala	Trp	Ala	Tyr	Phe	Ser	Asp	Val	
				965					970					975		
gac	ctg	gaa	aaa	gat	gtg	cac	tca	ggc	ttg	atc	ggc	ccc	ctt	ctg	atc	2976
Asp	Leu	Glu	Lys	Asp	Val	His	Ser	Gly	Leu	Ile	Gly	Pro	Leu	Leu	Ile	

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	caa gaa ttt gct ctg ttt ttc act att ttt gat gag aca aag agc tgg Gln Glu Phe Ala Leu Phe Phe Thr Ile Phe Asp Glu Thr Lys Ser Trp	3072
	1010 1015 1020	
	tac ttc act gaa aat gtg gaa agg aac tgc cgg gcc ccc tgc cat ctg Tyr Phe Thr Glu Asn Val Glu Arg Asn Cys Arg Ala Pro Cys His Leu	3120
	1025 1030 1035 1040	
	cag atg gag gac ccc act ctg aaa gaa aac tat cgc ttc cat gca atc Gln Met Glu Asp Pro Thr Leu Lys Glu Asn Tyr Arg Phe His Ala Ile	3168
	1045 1050 1055	
	aat ggc tat gtg atg gat aca ctc cct ggc tta gta atg gct cag aat Asn Gly Tyr Val Met Asp Thr Leu Pro Gly Leu Val Met Ala Gln Asn	3216
	1060 1065 1070	
	caa agg atc cga tgg tat ctg ctc agc atg ggc agc aat gaa aat atc Gln Arg Ile Arg Trp Tyr Leu Leu Ser Met Gly Ser Asn Glu Asn Ile	3264
	1075 1080 1085	
	cat tcg att cat ttt agc gga cac gtg ttc agt gta cgg aaa aag gag His Ser Ile His Phe Ser Gly His Val Phe Ser Val Arg Lys Lys Glu	3312
	1090 1095 1100	
	gag tat aaa atg gcc gtg tac aat ctc tat ccg ggt gtc ttt gag aca Glu Tyr Lys Met Ala Val Tyr Asn Leu Tyr Pro Gly Val Phe Glu Thr	3360
	1105 1110 1115 1120	
	gtg gaa atg cta ccg tcc aaa gtt gga att tgg cgg aat aga tgc ctg Val Glu Met Leu Pro Ser Lys Val Gly Ile Trp Arg Asn Arg Cys Leu	3408
	1125 1130 1135	
	att ggc gag cac ctg caa gct ggg atg agc acg act ttc ctg gtg tac Ile Gly Glu His Leu Gln Ala Gly Met Ser Thr Thr Phe Leu Val Tyr	3456
	1140 1145 1150	
	agc aag aag tgt cag act ccc ctg gga atg gct tct gga cac att aga Ser Lys Lys Cys Gln Thr Pro Leu Gly Met Ala Ser Gly His Ile Arg	3504
	1155 1160 1165	
	gat ttt cag att aca gct tca gga caa tat gga cag tgg gcc cca aag Asp Phe Gln Ile Thr Ala Ser Gly Gln Tyr Gly Gln Trp Ala Pro Lys	3552
	1170 1175 1180	
	ctg gcc aga ctt cat tat tcc gga tca atc aat gcc tgg agc acc aag Leu Ala Arg Leu His Tyr Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys	3600
	1185 1190 1195 1200	
	gag ccc ttt tct tgg atc aag gtg gat ctg ttg gca cca atg att att Glu Pro Phe Ser Trp Ile Lys Val Asp Leu Leu Ala Pro Met Ile Ile	3648
	1205 1210 1215	
	cac ggc atc aag acc cag ggt gcc cgt cag aag ttc tcc agc ctc tac His Gly Ile Lys Thr Gln Gly Ala Arg Gln Lys Phe Ser Ser Leu Tyr	3696
	1220 1225 1230	
	atc tct cag ttt atc atc atg tat agt ctt gat ggg aag aag tgg cag	3744

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Ile Ser Gln Phe Ile Ile Met	Tyr Ser Leu Asp Gly Lys Lys Trp Gln	
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Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu Met Val Phe Phe Gly Asn		
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gtg gat tca tct ggg ata aaa cac aat att ttt aac cct cca att att	3840	
Val Asp Ser Ser Gly Ile Lys His Asn Ile Phe Asn Pro Pro Ile Ile		
1265	1270	1275
gct cga tac atc cgt ttg cac cca act cat tat agc att cgc agc act	3888	
Ala Arg Tyr Ile Arg Leu His Pro Thr His Tyr Ser Ile Arg Ser Thr		
1285	1290	1295
ctt cgc atg gag ttg atg ggc tgt gat tta aat agt tgc agc atg cca	3936	
Leu Arg Met Glu Leu Met Gly Cys Asp Leu Asn Ser Cys Ser Met Pro		
1300	1305	1310
ttg gga atg gag agt aaa gca ata tca gat gca cag att act gct tca	3984	
Leu Gly Met Glu Ser Lys Ala Ile Ser Asp Ala Gln Ile Thr Ala Ser		
1315	1320	1325
tcc tac ttt acc aat atg ttt gcc acc tgg tct cct tca aaa gct cga	4032	
Ser Tyr Phe Thr Asn Met Phe Ala Thr Trp Ser Pro Ser Lys Ala Arg		
1330	1335	1340
ctt cac ctc caa ggg agg agt aat gcc tgg aga cct cag gtg aat aat	4080	
Leu His Leu Gln Gly Arg Ser Asn Ala Trp Arg Pro Gln Val Asn Asn		
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cca aaa gag tgg ctg caa gtg gac ttc cag aag aca atg aaa gtc aca	4128	
Pro Lys Glu Trp Leu Gln Val Asp Phe Gln Lys Thr Met Lys Val Thr		
1365	1370	1375
gga gta act act cag gga gta aaa tct ctg ctt acc agc atg tat gtg	4176	
Gly Val Thr Thr Gln Gly Val Lys Ser Leu Leu Thr Ser Met Tyr Val		
1380	1385	1390
aag gag ttc ctc atc tcc agc agt caa gat ggc cat cag tgg act ctc	4224	
Lys Glu Phe Leu Ile Ser Ser Gln Asp Gly His Gln Trp Thr Leu		
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ttt ttt cag aat ggc aaa gta aag gtt ttt cag gga aat caa gac tcc	4272	
Phe Phe Gln Asn Gly Lys Val Lys Val Phe Gln Gly Asn Gln Asp Ser		
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ttc aca cct gtg gtg aac tct cta gac cca ccg tta ctg act cgc tac	4320	
Phe Thr Pro Val Val Asn Ser Leu Asp Pro Pro Leu Leu Thr Arg Tyr		
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 <212> PRT

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<213> Artificial Sequence

<220>

<223> HP63/OL -- factor VIII variant

<400> 21

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 20      25      30
Trp Asp Tyr Arg Gln Ser Glu Leu Leu Arg Glu Leu His Val Asp Thr
 35      40      45
Arg Phe Pro Ala Thr Ala Pro Gly Ala Leu Pro Leu Gly Pro Ser Val
 50      55      60
Leu Tyr Lys Lys Thr Val Phe Val Glu Phe Thr Asp Gln Leu Phe Ser
 65      70      75      80
Val Ala Arg Pro Arg Pro Pro Trp Met Gly Leu Leu Gly Pro Thr Ile
 85      90      95
Gln Ala Glu Val Tyr Asp Thr Val Val Val Thr Leu Lys Asn Met Ala
 100     105     110
Ser His Pro Val Ser Leu His Ala Val Gly Val Ser Phe Trp Lys Ser
 115     120     125
Ser Glu Gly Ala Glu Tyr Glu Asp His Thr Ser Gln Arg Glu Lys Glu
 130     135     140
Asp Asp Lys Val Leu Pro Gly Lys Ser Gln Thr Tyr Val Trp Gln Val
 145     150     155     160
Leu Lys Glu Asn Gly Pro Thr Ala Ser Asp Pro Pro Cys Leu Thr Tyr
 165     170     175
Ser Tyr Leu Ser His Val Asp Leu Val Lys Asp Leu Asn Ser Gly Leu
 180     185     190
Ile Gly Ala Leu Leu Val Cys Arg Glu Gly Ser Leu Thr Arg Glu Arg
 195     200     205
Thr Gln Asn Leu His Glu Phe Val Leu Leu Phe Ala Val Phe Asp Glu
 210     215     220
Gly Lys Ser Trp His Ser Ala Arg Asn Asp Ser Trp Thr Arg Ala Met
 225     230     235     240
Asp Pro Ala Pro Ala Arg Ala Gln Pro Ala Met His Thr Val Asn Gly
 245     250     255
Tyr Val Asn Arg Ser Leu Pro Gly Leu Ile Gly Cys His Lys Lys Ser
 260     265     270
Val Tyr Trp His Val Ile Gly Met Gly Thr Ser Pro Glu Val His Ser
 275     280     285
Ile Phe Leu Glu Gly His Thr Phe Leu Val Arg His His Arg Gln Ala
 290     295     300
Ser Leu Glu Ile Ser Pro Leu Thr Phe Leu Thr Ala Gln Thr Phe Leu
 305     310     315     320
Met Asp Leu Gly Gln Phe Leu Leu Phe Cys His Ile Ser Ser His His
 325     330     335
His Gly Gly Met Glu Ala His Val Arg Val Glu Ser Cys Ala Glu Glu
 340     345     350
Pro Gln Leu Arg Arg Lys Ala Asp Glu Glu Glu Asp Tyr Asp Asp Asn
 355     360     365
Leu Tyr Asp Ser Asp Met Asp Val Val Arg Leu Asp Gly Asp Asp Val
 370     375     380
Ser Pro Phe Ile Gln Ile Arg Ser Val Ala Lys Lys His Pro Lys Thr
 385     390     395     400
Trp Val His Tyr Ile Ala Ala Glu Glu Glu Asp Trp Asp Tyr Ala Pro
 405     410     415
Leu Val Leu Ala Pro Asp Asp Arg Ser Tyr Lys Ser Gln Tyr Leu Asn
 420     425     430
Asn Gly Pro Gln Arg Ile Gly Arg Lys Tyr Lys Lys Val Arg Phe Met
 435     440     445
Ala Tyr Thr Asp Glu Thr Phe Lys Thr Arg Glu Ala Ile Gln His Glu

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450	Ser Gly Ile Leu Gly Pro	455	Leu Leu Tyr Gly Glu Val Gly Asp Thr Leu	460
465	Leu Ile Ile Phe Lys Asn Gln Ala Ser Arg Pro Tyr Asn Ile Tyr Pro	470	Leu Leu Tyr Gly Glu Val Gly Asp Thr Leu	475
		485	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	490
His Gly Ile Thr Asp Val Arg Pro Leu Tyr Ser Arg Arg Leu Pro Lys		500	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	510
Gly Val Lys His Leu Lys Asp Phe Pro Ile Leu Pro Gly Glu Ile Phe		515	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	525
Lys Tyr Lys Trp Thr Val Thr Val Glu Asp Gly Pro Thr Lys Ser Asp		520	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	535
Pro Arg Cys Leu Thr Arg Tyr Tyr Ser Ser Phe Val Asn Met Glu Arg		530	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	540
545	Asp Leu Ala Ser Gly Leu Ile Gly Pro Leu Leu Ile Cys Tyr Lys Glu	550	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	555
		565	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	570
Ser Val Asp Gln Arg Gly Asn Gln Ile Met Ser Asp Lys Arg Asn Val		580	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	585
Ile Leu Phe Ser Val Phe Asp Glu Asn Arg Ser Trp Tyr Leu Thr Glu		595	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	600
Asn Ile Gln Arg Phe Leu Pro Asn Pro Ala Gly Val Gln Leu Glu Asp		610	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	615
Pro Glu Phe Gln Ala Ser Asn Ile Met His Ser Ile Asn Gly Tyr Val		625	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	630
Phe Asp Ser Leu Gln Leu Ser Val Cys Leu His Glu Val Ala Tyr Trp		645	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	650
Tyr Ile Leu Ser Ile Gly Ala Gln Thr Asp Phe Leu Ser Val Phe Phe		660	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	665
Ser Gly Tyr Thr Phe Lys His Lys Met Val Tyr Glu Asp Thr Leu Thr		675	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	680
Leu Phe Pro Phe Ser Gly Glu Thr Val Phe Met Ser Met Glu Asn Pro		690	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	695
Gly Leu Trp Ile Leu Gly Cys His Asn Ser Asp Phe Arg Asn Arg Gly		705	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	710
Met Thr Ala Leu Leu Lys Val Ser Ser Cys Asp Lys Asn Thr Gly Asp		715	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	720
Tyr Tyr Glu Asp Ser Tyr Glu Asp Ile Ser Ala Tyr Leu Leu Ser Lys		725	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	730
Asn Asn Ala Ile Glu Pro Arg Ser Phe Ser Gln Asn Ser Arg His Pro		740	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	745
Ser Thr Arg Ser Gln Asn Pro Val Leu Lys Arg His Gln Arg Glu		755	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	760
Ile Thr Arg Thr Thr Leu Gln Ser Asp Gln Glu Ile Asp Tyr Asp		770	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	775
785	Asp Thr Ile Ser Val Glu Met Lys Lys Glu Asp Phe Asp Ile Tyr Asp	790	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	795
		805	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	810
Glu Asp Glu Asn Gln Ser Pro Arg Ser Phe Gln Lys Arg Thr Arg His		820	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	825
Tyr Phe Ile Ala Ala Val Glu Gln Leu Trp Asp Tyr Gly Met Ser Glu		835	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	840
Ser Pro Arg Ala Leu Arg Asn Arg Ala Gln Asn Gly Glu Val Pro Arg		850	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	855
Phe Lys Lys Val Val Phe Arg Glu Phe Ala Asp Gly Ser Phe Thr Gln		865	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	870
Pro Ser Tyr Arg Gly Leu Asn Lys His Leu Gly Leu Leu Gly Pro		885	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	890
Tyr Ile Arg Ala Glu Val Glu Asp Asn Ile Met Val Thr Phe Lys Asn		900	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	905
Gln Ala Ser Arg Pro Tyr Ser Phe Tyr Ser Ser Leu Ile Ser Tyr Pro		915	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	920
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Asn Glu Thr Lys Thr Tyr Phe Trp Lys Val Gln His His Met Ala Pro		945	Gln Ala Ser Arg Pro Tyr Ser Arg Arg Leu Pro Lys	950
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 Asp Leu Glu Lys Asp Val His Ser Gly Leu Ile Gly Pro Leu Leu Ile
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 Cys Arg Ala Asn Thr Leu Asn Ala Ala His Gly Arg Gln Val Thr Val
 995 1000 1005
 Gln Glu Phe Ala Leu Phe Phe Thr Ile Phe Asp Glu Thr Lys Ser Trp
 1010 1015 1020
 Tyr Phe Thr Glu Asn Val Glu Arg Asn Cys Arg Ala Pro Cys His Leu
 1025 1030 1035 1040
 Gln Met Glu Asp Pro Thr Leu Lys Glu Asn Tyr Arg Phe His Ala Ile
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 Asn Gly Tyr Val Met Asp Thr Leu Pro Gly Leu Val Met Ala Gln Asn
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 Gln Arg Ile Arg Trp Tyr Leu Leu Ser Met Gly Ser Asn Glu Asn Ile
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 Glu Tyr Lys Met Ala Val Tyr Asn Leu Tyr Pro Gly Val Phe Glu Thr
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 Val Glu Met Leu Pro Ser Lys Val Gly Ile Trp Arg Asn Arg Cys Leu
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 Ser Lys Lys Cys Gln Thr Pro Leu Gly Met Ala Ser Gly His Ile Arg
 1155 1160 1165
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 Leu Ala Arg Leu His Tyr Ser Gly Ser Ile Asn Ala Trp Ser Thr Lys
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 Thr Tyr Arg Gly Asn Ser Thr Gly Thr Leu Met Val Phe Phe Gly Asn
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1460

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